



Determinants of the scaling-up of a start-up: the case of ScaleUp Porto from Porto Digital

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Internship Report

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Biographic Note

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Resumo

Este relatório de estágio baseia-se nas principais contribuições científicas associadas às atividades desenvolvidas durante o estágio na empresa Porto Digital. A empresa possui várias iniciativas, incluindo o ScaleUp Porto, uma missão recente e inovadora para a qual o estágio foi alocado. Esta iniciativa está relacionada com o desenvolvimento de empresas *start-up*, apoiando o seu crescimento e a sua escala de modo sustentável e promovendo o ecossistema de inovação na cidade do Porto. O conceito *scale-up* é relativamente recente e a investigação publicada sobre o assunto é ainda escassa.

O relatório centra-se nas empresas *start-up* e no seu crescimento em ambientes específicos, favoráveis a futuras estratégias de internacionalização, articulados com a importância de promover o Porto enquanto lar para empresas *scale-up*. Várias tarefas foram desenvolvidas durante o estágio curricular, como a pesquisa de melhores práticas noutras cidades, a compreensão dos fatores críticos de sucesso e das falhas do Porto e o que o Município do Porto pode fazer para apoiar a expansão das empresas.

Uma vasta revisão bibliográfica sobre estes temas foi realizada, essencial para entender a dinâmica associada às empresas *start-up* e *scale-up* e a sua internacionalização. Foram realizadas entrevistas de modo a complementar as atividades do estágio e a compreender as condições que a cidade do Porto oferece, as características das empresas *scale-up* e o seu processo de internacionalização.

Este trabalho permite concluir que a cidade do Porto tem condições para contribuir para o crescimento de empresas como *scale-ups*, como a existência de incubadoras e talento na cidade. No entanto, há aspetos que devem ser melhorados.

Sobre o conceito *scale-up*, observou-se que muitas empresas estão no limiar de ambos os conceitos (*start-up* e *scale-up*). Embora seja necessária uma investigação adicional, algumas características foram sistematizadas, tais como: muitas empresas internacionalizam os seus negócios instantaneamente; as redes são essenciais; existem traços comuns na forma como os seus negócios são expandidos para o exterior, sendo o tamanho reduzido do mercado português um dos principais motivos da internacionalização.

Palavras-chave: *Start-up*, *Scale-up*, Inovação, Empreendedorismo, Internacionalização.

Abstract

This internship report is based on the main scientific contributions associated with the activities developed during the internship at Porto Digital. The company has several initiatives, including the ScaleUp Porto, a recent and innovative mission to which the present internship is allocated. This initiative is related with the development of start-ups, supporting their sustainable growth and scale and promoting the innovation ecosystem in the city of Porto. The concept scale-up is relatively new and published research on the topic is still scarce.

The report focuses on start-ups and their growth within specific environments, favourable to future internationalization strategies, articulated with the importance of promoting Porto as a home for scale-up companies. Several tasks were developed during the internship at Porto Digital, namely, the search for best practices in other cities, the understanding of the critical success factors and failures of Porto and what can the Municipality of Porto do to support scale-up processes.

An encompassing literature review on these topics was conducted, essential to understand the dynamics associated with start-up and scale-up companies and their internationalization. Interviews were made in order to complement the internship activities as well as to understand the conditions of the city of Porto, the characteristics of scale-up companies and their internationalization process.

This work allows concluding that the city of Porto has conditions to allocate and contribute for the growing path of companies like scale-ups, as the existence of incubators and talent in the city. Nevertheless, there are aspects that must be improved.

About the scale-up concept, it was observed that many companies are on the threshold of both concepts (start-up and scale-up). Although additional research is needed, some characteristics were systematized such as: many companies internationalize their business instantly; networks are essential; common traits in the way their business are expanded abroad, with the small size of the Portuguese market being one of the main reasons for the internationalization.

Keywords: Start-up, Scale-up, Innovation, Entrepreneurship, Internationalization.

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1. Introduction: motivations, objectives and research question

This report presents and analyses the work developed during the internship at Porto Digital, in particular associated with the development of the ScaleUp Porto and ScaleUp for Europe initiatives. ScaleUp Porto is an initiative designed to encourage and promote the innovation ecosystem, looking for companies with high growth potential and helping them in several areas (financing, skills, customers, etc.) by providing an easier way to achieve opportunities. This new strategy for the city and region of Porto (City Hall of Porto, 2016; Metropolitan Area of Porto, 2016)¹ aims to invest in a more competitive paradigm for the regional economy and supports, mainly, local technology start-ups with potential to scale internationally, helping them to achieve sustainable development and growth in the global economy. Is also a contribution of the city to the ScaleUp for Europe movement, highlighting the importance of involving cities in the process of the ecosystems growth (ScaleUp Porto, 2017). So, this concept (scale-up) appears as a next stage of a start-up business that intends to enter in new markets, raise income and employees, and add value to the company by cooperating and linking up with other companies/ entities in those markets (Onetti, 2014).

Founded in 2004 by Porto City Hall, the University of Porto and the Porto Light rail company, Porto Digital is a non-profit organization that aims to support e-government, entrepreneurship, education, innovation, Research & Development (R&D) and Information Technology (IT) projects. Directed by the City Council, in February 2010 founders of Porto Digital developed a new strategic plan with the purpose of developing the city of Porto as a city based on knowledge, bringing innovation to the core of the town. According to Porto Digital, this strategy contributed to a better vision of Porto, which is now a place where qualified job opportunities are rising and where people feel more attracted to come to the city, in particular, young entrepreneurs, stimulated not only by the culture but also by the new multicultural and international ecosystem that they can integrate (Porto Digital, 2017).

The main task of the internship is to continue to develop not only the ScaleUp Porto initiative but also to establish a basis for the internationalization (expansion to the

¹ Porto is a city of Portugal (the second major of the country) and one of the most important urban centre in the South of Europe. Considered one of the oldest cities of Europe, was recorded in 1996, by UNESCO, as a World Heritage Site. In addition, was named in 2001 as the European Capital of Culture.

European scale) of the initiative, starting with the developed work and building up an implementation strategy and marketing; building a network of cooperation at the European level. The main tasks proposed within the internship are associated with the following: (i) systematize the concept of scale-up; (ii) search for cities that are already experienced in this area; (iii) after the identification of these target cities, analyse their procedures and look up for people and institutions that can help to build this network; (iv) understand what kind of support can the Municipality of Porto give to companies wishing for scale.

In order to implement these tasks, it will be necessary to codify new ideas about this in specific programmes, looking for opportunities, trying to attract talent, and identifying what are the critical success factors and failures of Porto and what can be done to improve the city. Hence, the present report aims to answer the following questions: How to make Porto a hub of scale-up attraction and their investment? What are the determinants to evolve into scale-up companies? And how is the whole process of internationalization of these companies?

The study of scale-up companies is vital because they can be very important to local economies, acting as an encouragement to other companies and even individuals. Evidence shows that scale-up companies are able to streamline local environments, attracting skilled persons and contributing to their continuous learning, making networks with local companies and persons, creating more highly skilled and quality jobs, as well as being a contributor to the rise of the national output (Coutu, 2014). The concept of scale-up is relatively new in the literature and must be further explored. There are several scientific references about start-up companies but not about the scaling process, as well as many programmes and initiatives to start-up companies, but not for scale-ups (ScaleUp, 2016) (See Appendix I).

In order to answer the above research questions, to complement the activities developed at Porto Digital, and to better understand how a city can contribute to the growth of start-up and scale-up companies (taking Porto as an example), a qualitative analysis was implemented, focused on interviews to these companies. With this qualitative analysis, it will be possible to better understand their evolution, needs, motivations, obstacles, characteristics and profile when they implement a strategy for internationalization.

After this introduction, a literature review will be structured (Section 2), relevant to understand several concepts, such as start-up, scale-up, innovation and entrepreneurship. It is important to start by understanding the differences between a start-up and a scale-up and, subsequently, the environment required to their sustainable growth. Still in this section, a brief explanation of the internationalization of small entrepreneurial firms is given, where the strategies and possible modes of entry are exposed. In section 3, a brief introduction about Porto Digital is made as well as the explanation of the activities that were developed at the internship. Afterwards, in Section 4, the methodology of this report is clarified and in Section 5 the analysis of the results collected during the investigation is described. The conclusions, main limitations and potential venues for future research appear in Section 6.

2. Entrepreneurship and innovation in a scaling up process: a literature review

In order to better understand what the scale-up process of a firm is, it is important to first apprehend some terms associated with this concept. So, firstly, this review will be constituted by the definition of the central concepts (Section 2.1). Secondly, in Section 2.2 major concepts associated with the phenomenon of scale-up, as innovation and entrepreneurship, are addressed. At Section 2.3 the environments and industries that allow the growth of these companies are analysed. And finally, in Section 2.4, the internationalization processes of small entrepreneurial firms are investigated, including determinants, strategies and modes of entry.

2.1 Start-up and scale-up companies

2.1.1 The concept of start-up and the probability of survival for a start-up

Start-ups have been defined by three words: new, active and independent. To define start-up business, these characteristics must be together. Start-ups have a criterion that is consensually considered as the main one, “new”, as a start-up being any new firm created in a certain period. Moreover, to be a start-up, it is necessary to be an active business, in other words, to be involved in the exchange of goods or services. And finally, it is required to be independent. This concept is related to the affiliation between the new created firm and the company where the founder worked (Luger and Koo, 2005).² Brüderl and Preisendörfer (2000) discovered that the fast growth of companies is negatively related to the size of the start-ups and the knowledge of the founders, reinforcing that the probability of the rapid growth of a company is greater in companies with innovative activities. It is important to remark that from only some of the new, emergent, firms have a fast growth trajectory.

Many authors, as Schumpeter (1934) (*cfr.* Luger and Koo, 2005), have shown the positive relationship between new small firms (also known as start-ups) and the creation of employment, technological innovation and economic growth. It is also important to mention that these firms, with a fast growth and technology based, tend to

² According to Garvin (1983), a spin-off is a new company created by individuals of a firm, that end up leaving the original/ parent company, acting then as competitors. This is quite common in high technology industries.

attract workers from already established companies, with the innovation implied in the activities of these companies being a popular reason for the creation and growth of employment (Lautenschläger, 2015). In turn, technological start-ups are related with companies that have new solutions and ideas, that they implement, being usually represented in sectors associated with biotechnology, medicine, electronic commerce and others with equal high level of technology, and in which they contribute to the concept of knowledge-based economy (Audretsch *et al.*, 2012).

The initial stage of a life cycle of a start-up is an important step in the sense that technology is still flowing (Acs *et al.*, 2009). These years are vital for the future of the company since the literature suggests that these companies are more likely to fail than the oldest ones, with the failure of new firms being around 20% to 40% during the first 2 years (e.g., Bartelsman *et al.*, 2005). Similarly, Cader and Leatherman (2011) suggest that despite the creation of several small firms each year, many of them end up failing. This study reveals that 15% of these firms fail during the 1st year; 13% before the final of the 2nd year; more than 40% until the 3rd year; and less than half of all start-up business survive beyond 5 years. They also sustain that firms in the area of technology are more prone to fail during the first 5 years and the reasons for this huge failure are related with factors such as industry characteristics, the location, regional and national economic conditions and environmental factors. Entrepreneurial features are essential in this phase, when the company is not completely developed yet and is still organizing itself (Baptista *et al.*, 2014). For a systematization of relevant contributions on this topic see Table A2.1 in Appendix II.

2.1.2 Scale-up companies

Scale-up company is a more developed and established firm than a start-up (SEP Monitor, 2015). To be a scale-up company it is necessary to have a sustained average annual growth in workers or turnover in more than 20 per cent per year for three full years, and also have over 10 employed persons when the observation period starts, being characterized as companies that can grow quickly in prolonged periods (Coutu, 2014). A scale-up company is also defined by the World Economic Forum (2014) as the expansion of a business regarding the access to markets, incomes, added value and number of workers, capable of identify and enjoy advantageous opportunities along with diverse players in the market. Or even further, described as innovative new firms/

start-ups that have a rapid growth in markets, transforming whole industries with new business models and facing truly opponents (Deloitte and THINK, 2015).

These firms are essential to improve production factors and may induce the international competitiveness of an economy, with the raise of employment, the increase in the capacity to produce goods and services (and their market value) and by extending over a long time the efficiency of production (Coutu, 2014). SEP Monitor (2015) add that scale-ups not only can raise employment but also innovation in scale. After five years, it is expectable that they have a revenue of more than \$10 million, being generators of employment when they achieve maturity (generally 10 years after their creation) (Deloitte and THINK, 2015). The scaling-up process enables a firm to stay away from possible competitive attacks from other firms, especially when this process is made quickly, deriving from Information and Communication Technologies (ICT), and with strategic innovation that allows a firm to grow rapidly and sustainably. It also enables a firm to have profits and success in the future (Markides and Anderson, 2006).

Deloitte and THINK (2015) conclude that only 1 out of 200 new firms turn into scale-up, no matter the place where they are founded or the based-activity. The experience and know-how acquired, many times in other companies, are the best boosters to scaling-up. There are products that are relatively more inherent to be scaled, and so to be expanded to other markets as in software, electronic, media, energy, online services and infrastructure areas. However, they need to be aware that the complexity at bureaucratic, administrative or coordinative/ control level rises when the company decides to expand its business. Table A2.2 in Appendix II systematizes important contributions about scale-up companies.

2.2 Main concepts associated with the scale-up process

2.2.1 Innovation, competitive advantage and the ecosystem

In general, societies observed a significant change in the 1970s and 1980s when events such as oil crises, economic downturns, technological progress, increased internationalization and political modifications changed the perspective of the market. An enabling environment for innovation and entrepreneurship emerged, due to the uncertainty and imbalance that took place in societies (Cornelius *et al.*, 2006). In what

concerns the concept of innovation and its importance for firms some contributions were made:

- Schumpeter defined innovation as distinct possible combinations that influence the development of an economy. Adding that innovation can be: the conception or improvement of a new product; the development of a new technique of production; the discovery of a different market; the finding of an additional supply source; or the creation of a new industry group (Hébert and Link, 2006).
- Muller *et al.* (2005) states that innovative firms are the leaders in the market, whatever the industry.
- Akman and Yilmaz (2008) consider innovation an essential way to achieve the objectives of the company and be successful in its economic activity, as well as to improve its market position.

Williams and McGuire (2010) state that technological advances and higher productivity happen due to innovation, promoting the wealth of a nation. The authors find support in Porter (1990) that stated that nowadays competition is huge, worldwide and based on knowledge and the competitiveness of a country is related with its capacity to innovate and upgrade. Innovation implicates knowledge and competences that, when associated with the ability to find new opportunities in the market, generate advantages over a company's opponents. Competitor's pressure in the market and challenges that companies must overcome, as ambitious customers and tough suppliers, make companies develop a competitive advantage to surpass them, because the most active rivals will always find a way to overcome an opponent, like finding cheaper ways of developing products. Muller *et al.* (2005) strengthen that a competitive advantage, most likely achieved by the firm's constant innovation, is only sustainable if the firm develop continuously its innovative skills, otherwise, it will not be able to surpass neither the competitors nor new and innovative technologies, rigorous clients, less long product life cycles, globalization and other factors. Porter (1990) defends that this is possible through continuously innovative performances and improvements that can be expressed by a new design of a product, a new procedure of production, a new marketing method or simply new ways of doing things. Akman and Yilmaz (2008) state that proactivity is an important factor that remains in innovative companies. This

strategy facilitates and improves innovation because provides a more flexible organizational structure, helping companies to achieve new opportunities, knowing how to better predict market changes and be faster than their competitors.

An innovative ecosystem refers to a place, specialized in knowledge, where knowledge and innovative activities are abundant (and applied), producing business that can add value to a global network (Oksanen and Hautamäki, 2014). The innovation ecosystem is the habitat for the conception of innovation, where the cooperation of diverse players is essential, as well as the fortification of the relationships and alliances. Today, more than a few countries develop a national strategy through innovative ecosystems that consist on the combination of management mechanisms, financing organisms, research institutions and the collaboration between universities and companies (Kao, 2009). Similarly, Williams and McGuire (2010) defend that innovation is more successful if there is collaboration between school academies, R&D establishments, related associations and organizations in the industry, suppliers, clients, and many others. Adding to this, it is important to get involved with entities that can provide necessary resources as financial capacity. Oksanen and Hautamäki (2014) also have the same perspective, indicating that an innovative ecosystem needs:

- The best institutions of higher education;
- Capable and expertise workers;
- Great establishments endowed for doing research;
- Supporting funding;
- Global networking;
- Collaboration between companies (large and start-ups);
- A local market capable of receiving innovative products;
- And, other institutions, as incubators and science parks.

A country with a variety of cultural groups, global reach, well-known for innovation, provider of talent people, with good and sufficient infrastructures, education institutes and scientific capitals has the capability to transform innovation (Kao, 2009). For a better ecosystem, a higher standard of life and exceptional business opportunities must be associated, jointed with a dynamic network of local, regional and national level. With a full innovative ecosystem and the best actors solving diverse challenges, innovation is possible. It is important to unceasingly develop and make stronger these

innovative ecosystems so managers can more efficiently follow structural changes and innovate. It is crucial to have an ecosystem with a culture based on risk taking entrepreneurs, constantly producing new ideas, as well as an interactive movement of persons between the dynamic firms in the environment (Oksanen and Hautamäki, 2014).

2.2.2 The importance of entrepreneurship

Research in the entrepreneurship field has only about 25 years, but there was a huge development since then (Cornelius *et al.*, 2006). Shane *et al.* (2003) declare that entrepreneurship is associated with the look for opportunities by individuals, and it is essential for the innovation process. Besides the process of finding, appraisal and exploration of opportunities, entrepreneurship involves agents who want to play this game. Although personal motivation is extremely important in this process, other determinants are relevant such as, for example, the state of the economy, the access to financing, competition behaviour and government policies.

Schumpeter defends the creative destruction as the core of the development of the economy, in which there is a circular flow perturbation because development occurs in industrial and commercial courses (through production development and improvement) but not in consumption. He sees entrepreneurs as the most important agents for the development of an economy (Hébert and Link, 2006). Schumpeter (1934, p. 78) (*cfr.* Hébert and Link, 2006) says that a person is an entrepreneur just if he/she executes new combinations in his/her business, and stop being an entrepreneur when starts to manage his/her business as everyone else. With a distinct perspective from Schumpeter, Kirzner states the re-establish of the balance, seeing entrepreneurship as a way to find unfilled gaps in the market and gain with that. Entrepreneurs are the way to which the market equilibrium is restored, made by the competition in dynamic markets that drive the economy to the equilibrium (Klein, 1975). But, as Teece (2007) observe, it is known that both perspectives are important to the economy. Entrepreneurship is essential to identify breaks in the society and take advantage to fill those gaps, taking this as a business chance to becoming more innovative and satisfy the necessities of the population.

There are two sorts of entrepreneurship: necessity and opportunity entrepreneurship. Necessity entrepreneurship is required for the entrepreneur while

opportunity entrepreneurship is an eagerness to look for something that can bring benefits. What distinguishes both is the entrepreneur motivation in starting a business. So, opportunity entrepreneurs believe that they hold the knowledge, experience and competences to develop a success business. According to this categorization, there are some settings of a region that will influence the creation of opportunities and, therefore, will be followed by expertise entrepreneurs with motivation (Bygrave *et al.*, 2003). If the investment in new knowledge is big, then more entrepreneurial opportunities will exist. Entrepreneurship can act as a channel where knowledge developed by established companies is welcomed by new developing companies, thereby contributing to economic growth. Factors such as the opposition to take risks, legal limitations, bureaucratic restraints, taxes, culture and traditions are important for entrepreneurship, and these last two factors are not so clear to recognise than economic ones. These factors are relevant when a person decide to start a business because knowledge is not always enough, even when can bring large profits to the company (Acs *et al.*, 2009).

2.3 Environments and industries favourable for the growth of start-up and scale-up companies

2.3.1 Knowledge-based city

A knowledge-based city is a city with knowledge directly related with concepts like innovation, clusters, networks and entrepreneurship, and often focused on the economic field. However, cultural and creative resources are also important to be mentioned when talking about knowledge-based cities (Graham, 2002). Being a city with a broad base of knowledge can be considered as a major advantage, not only in the own country but also overseas. For that, R&D investments are increasingly important for promoting this kind of knowledge, where it is possible to develop new goods, facilities and procedures. This development enables the creation of new innovative shares and the increase of the economic status of the city (with, for example, lower costs in the established production and more efficiency). This is only possible if the city has savvy entrepreneurial spirit and remarkable human resources (Lever, 2002).

Audretsch and Keilbach (2007) reveal that start-ups that spend more money in acquiring knowledge have a greater entrepreneurial activity. The same happens in regions abundant in knowledge: they have higher entrepreneurship rates in high

technology and ICT fields. So, entrepreneurial opportunities are higher in regions where investment in knowledge occurs. Florida (1995) argues that businesses related to innovation are usually close to each other, instead of being dispersed in a region, because regions are essential to this new era of knowledge, where knowledge can be developed and learned, and where there are several types of infrastructures that can support innovative and productive processes of firms.

2.3.2 Creative economy, creativity and creative industries

A creative economy exists because there are creative resources that can potentially provide growth and development for an economy, since the generation of employment, export earnings, wealth, cultural diversity and human development. Creative economy is not only about culture but also about social and economic fields, related with, for example, technology or intellectual property. A creative economy can also be defined as the group of economic activities based on knowledge that can provide development. This type of economy is frequently connected with creativity, being this one a main resource for the conception of new ideas (UNCTAD, 2008).

Creativity is not only associated with culture, it is also characterized by an economic and technological role, from the creation of a new company, the production of an event or the invention of a new product; entrepreneurship links these three categories (Piergiovanni *et al.*, 2012). Creativity has an economic feature that can add value to entrepreneurship, rise innovation and productivity, and contribute to the growth of an economy (UNCTAD, 2008). Creativity by itself is not enough; it is about producing ideas, and innovation is about to turn them into something real and objective, so creativity is a concept that usually precedes innovation. It is necessary to apply current knowledge and develop new one applicable to the generated idea. A major paradox is the thought that creativity is only needed in certain areas, such as R&D. In fact, it is necessary in all dimensions of a company (Gurteen, 1998).

This understanding of creativity is also on the basis of creative industries, where creative ideas are developed and innovation is increased in several areas: advertising, architecture, broadcasting, design, music, film and video, performing arts, publishing, R&D, software, and others. Therefore, competitive advantages to a firm and to an economy of a country are created (UNCTAD, 2008). Townley *et al.* (2009) define creative industries, dividing them into three categories: “intellectual capital”, “social

capital” and “cultural capital”, referring to creativity, connectivity with others and high skills. Creative industries are dependent on personal characteristics that are based on the imagination process and the expression of ideas (UNCTAD, 2008). It is the human factor that brings success through the generation of ideas, characterizing in this way the creative industries (Piergiovanni *et al.*, 2012).

Audretsch *et al.* (2010) state that if there weren't differences between people, everyone will agree with the same new ideas and there was no sense to start new businesses. A region with a lot of diversity tends to be more entrepreneurial than a region where everyone thinks in the same way and has similar backgrounds. In this kind of regions, abundant in knowledge, it is assumed that managers can more easily find knowledge and learn, and so apply it in entrepreneurial activities. Nowadays, creative industries are one of the most dynamics in the world (UNCTAD, 2008).

2.3.3 Incubators and Accelerators

Incubators are one of the several businesses created to facilitate and support start-ups in their first years of life, differentiating from other businesses for the extensive range of services that they offer (Carayannis and von Zedtwitz, 2005). Two types of incubators can be mentioned: economic development incubators, dealing with local gaps and with a goal to promote the development and the creation of companies; and technology incubators, which focus on firms with technological scope and where the main goal is to generate entrepreneurship and boost innovation. The primary objective of incubators is to nurture economic development and promote competitiveness by creating new start-ups (with technological focus). The major task is to turn firms into successful cases, leaving the programme with better conditions. A high-quality incubator is the one that can attract a considerable number of start-ups, capable of producing companies that can survive after leaving the incubator, enabling the approach to financial marketplaces and well-built connections with R&D institutes, universities and industries (Aernoudt, 2004).

At the beginning of a business, according to Carayannis and von Zedtwitz (2005), entrepreneurs need some tips so their firms can grow successfully. For this, incubators have some mentorship programmes that can guide a business, helping entrepreneurs to define their business plan and to improve leadership and management abilities, or giving them expert services, as accounting or some legal advice.

Entrepreneurs also need these businesses to give them access to physical supplies, as a place to work, IT infrastructures, furniture, computer network, and others, as well as basic services (like secretarial and reception services) that allow start-ups to economize time and energy. Similarly to other business, as business angels³ or consulting companies, they also provide services in the area of management and financing (access to interested investors). Managers of incubators defend that the presence in a network is essential to be successful. Hence, they give entrepreneurs access to networks. The best incubators are able to recognise what are the most important contacts for a start-up because usually incubators have an established network created (that start-ups haven't yet). These contacts can be, for example, a potential client, a good programmer, a new person for the company or an investor. However, only the best and strongest incubators offer all these elements:

- Access to material assets;
- Office provision;
- Access to financial capitals;
- Entrepreneurial assistance;
- And access to a range of contacts.

Besides all the aspects mentioned, Aernoudt (2004) adds that an incubator must help their clients to entry into new markets. It is necessary to create a propitious environment in Europe that can enable the development of new firms, make them grow and be innovative inside competitive markets, and also teach the society to be more risk-taking and entrepreneurial.

Another related concept is named as accelerator. The purpose of an accelerator is to help start-ups, ready to move forward, giving them access to a propitious environment and promoting entrepreneurship, with a close supervision and support so they can grow quickly, in a little time space (3 to 6 months usually) (Pauwels *et al.*, 2016). Accelerators interact with different business innovation areas and, in most cases, they concentrate themselves in start-ups with a recent formation (Cohen and Hochberg, 2014). In addition, there are other characteristics that these organizations can provide, such as networking opportunities, assets and supportive assistance to the workplace,

³ According to Bygrave *et al.* (2003), a business angel is a company that invests a large quantity of money in entrepreneurial ventures with the potential to turn into worthwhile companies.

mentoring services (with experienced entrepreneurs), contacts with business angels and other small venture capitalists, and connection with possible customers (Pauwels *et al.*, 2016). Start-ups that apply to acceleration programmes have to pay a small tax, but, in return, they can receive a small amount of capital required to finance the necessary research and participate in some developed activities as events and mentoring. Several start-ups have grown and have been developed and graduated in this kind of programmes in the last years (Cohen and Hochberg, 2014).

Although there are many success accelerators in the world and this term has rapidly spread, there isn't much empirical information about them. In 2014, there were more than 2.000 accelerators in all continents with the number growing very fast. The lack of studies about accelerators is explained by the novelty of this type of organizations and the lack of related data. In fact, the definition of accelerators isn't clear and, sometimes, accelerators are defined as incubators. The major difference is related with the duration of the support given by accelerators that is quite shorter but more intense (Cohen and Hochberg, 2014). It is known that this model inspires entrepreneurs and promote entrepreneurship (Pauwels *et al.*, 2016).

2.3.4 Networks and the process of internationalization

Networks are gaining more and more importance in the last years. No matter the location, language or culture, it is valuable when companies have a connection with other companies or individuals in the other side of the world. Through networks, it is possible for entrepreneurs to have access to resources and talent in other places and develop a competitive advantage (Kao, 2009), making synergies for knowledge and endowment, creating value together. But this is only possible if there are strong relationships between firms, persons and venture organizations (Oksanen and Hautamaki, 2015).

Coviello and Munro (1995) argue that developed networks are essential to small firms' internationalization, underlining entrepreneurial firms based on high technology. Small entrepreneurial companies must establish contacts that may be useful to their internationalization in several markets. Persons involved in these networks are able to influence some decisions made by these firms, as the entry mode or the markets' choice. These networks can create opportunities to a firm, enabling a participation in various external markets in a fast way. So, decisions made by a firm don't result only from the

managers' strategy. These contacts can give the firm an easier access to opportunities in external markets and make the risk related to the entry in new markets lower. The relationships created in internal markets (with suppliers, clients, opponents and external organizations) are useful even when a company go abroad, since it will not have to develop again all the relationships in external markets (Johnsen and Johnsen, 1999).

In order to see its young company supported since early, contributing to its growth, many entrepreneurs choose more strategic relationships than social ones, especially when aiming a large development. This can be seen many times, for example when entrepreneurs cooperate with rivals from their internal market in foreign countries. So, networks encourage firms not only domestically but also internationally, supporting them with resources that they lack (Chetty and Wilson, 2003).

In Figure 1 (Appendix II) a mind map is presented in order to represent an integrated perspective on all the concepts addressed in the sections above.

2.4 Internationalization Processes

The number of firms that actively work abroad since the beginning of their operations, called many times as born global firms or international new ventures, have grown more and more, increasing the world trade. A booster of this occurrence may be related with the reduction of transaction costs between countries, provoked by markets globalization (several companies have value chain activities and strategic alliances beyond borders to develop and distribute products). This is characterized by the rise of the homogenisation of consumer preferences in the world that facilitates international trade, simplifying the development and positioning of products in different countries. The reduction of costs is also a consequence of the advance of technologies in ICT's, production procedures and international transports and logistics in the world, that with the emergence of the Internet and other correlated technologies, made the internationalization by new firms a more viable and economic choice, encouraging them going overseas in their first years (Knight and Cavusgil, 2004). Start-ups that early decide to internationalize their business frequently increase their capital, production and sell their products in numerous countries, especially in high-tech industries where there is significant global competition (Oviatt and McDougall, 1994).

2.4.1 Distance between markets and determinants and conditions of internationalization

The reasons beneath internationalization are, many times, related with intense rivalry and market saturation but, for small firms, the main reason is related with new opportunities:

- spreading entrepreneurial abilities;
- calculating consciously the risks;
- gathering new arrangements of products, services and/or technologies;
- using network links;
- using the knowledge developed in the local market (Fletcher, 2004).

Companies in the high-tech branch should inevitably internationalize, because the investments are so high that national markets are not enough to overcome the expenditures (Seringhaus (1993) (*cfr.* McDougall and Oviatt, 1996)). Small entrepreneurial firms find opportunities in many external markets, regardless some distances between their internal markets and the new ones, as geographic or cultural (Loane and Bell, 2006). This is explained by Knight and Cavusgil (1996) (*cfr.* Loane and Bell, 2006), that state that the factors of this occurrence are mainly:

- the increase of trade liberalisation;
- the evolution of economic integration;
- the arising of ICT and new processes (highlighting the Internet and the World Wide Web (WWW));
- the development of worldwide networks;
- the internationalization of information and facilitating organizations.

Carlson (1975) (*cfr.* Johnsen and Johnsen, 1999) recognizes that, comparing with large firms, small ones tend to be more affected with psychological distance, especially firms with high technology products, that although have a perceived competitive advantage, tend to internationalize to more close markets. Johnsen and Johnsen (1999) explain this concept, arguing that companies are more likely to expand their business to countries with a culture similar to their home country. Johanson and Wiedersheim-Paul (1975) also describe psychological distance, stating that it is related with differences between nations, regarding the language spoken in the countries and their culture, as well as political systems, education and industrial development level,

inevitably related to physical distance (with exceptions). However, psychological distance can be irregular because of the improvement in communication techniques and in trade, mainly. The choice of the market is also important because some companies may choose to firstly expand their business to small markets, many times like their home market, expecting less commitment of resources or competition. However, even when a company decides to go abroad choosing markets culturally close to its home country, does not always guarantee success because it is important to first understand if the market looks for the offered products of the company (Johnsen and Johnsen, 1999). The company may adapt its own organizational system and relationships to the specific market chosen. So, companies don't necessary follow a constant strategy, they may choose different forms in each market. For a systematization of relevant contributions about the distance between markets see Table A2.3 in Appendix II.

When going abroad, a company needs to change its organizational structure and align its resources with the pressure made by competitors, industry performance and consumer requests. This implies costs that many companies don't have capability to afford, increasing the probability of failure (Sapienza *et al.*, 2006). Some costs associated with the internationalization are, for example, logistical costs, joining the need of managers to learn about the country in view (laws, language, culture and competitors) (McDougall and Oviatt, 1996). The fact that they are strangers in the markets, and so with no trust and reputation built there, makes the probability of surviving lower (Sapienza *et al.*, 2006). The lack of knowledge and resources are the main obstacle to expand a business abroad, jointly with the risk of investing in a different market (Johanson and Wiedersheim-Paul, 1975). The premature internationalization can lower the chance of survival of the firm because of the huge investments that are demanded in the initial period, but can also rise the probability of growth if the firm works hard and fast (Sapienza *et al.*, 2006).

Sapienza *et al.* (2006) state that the internationalization of young firms and the probability of their survival are related not only with the age of their internationalization, but also with the:

- Previous international experience of the managers, that replace the deficiency of organizational skills that young firms have when they internationalize;

- Characteristics of the resources that permit/ constrain their placement for other practices, reducing the expenses of investments that become irrecoverable when internationalizing and being able to permit the firm to seek new opportunities.

The knowledge of other languages besides the native one, the experience acquired in other markets or the early age of the manager (Pinney (1970) (*cfr.* Johnsen and Johnsen, 1999)), combined with external environments and other internal influences, could develop encouraging conditions to this kind of companies in expanding their business overseas. In this process, there are some elements that the firm may consider, like its competences, owned resources and opportunities. It is important to balance the risk associated with the internationalization of a business and the decision of staying only in the domestic country, suffering of market pressures (Johnsen and Johnsen, 1999).

Dynamic capabilities allow start-ups to have success in entry into new international markets. The early entry in international markets and the exposure to competitive conditions and different demands, allow the company to develop capabilities that enable it to be more adaptable to indeterminate environments and more receptive to continuous changes. Thus, if a firm internationalize early, more easily will introduce its capabilities in exploring opportunities in foreign markets. The exposure that these companies face, give them more opportunities to grow and learn (Sapienza *et al.*, 2006). Table A2.4 in Appendix II systematizes important contributions about the determinants and constraints of internationalization.

2.4.2 Internationalization strategy for small firms

Stage models, as the Uppsala model (a more slow and incremental strategy), suggest that a company explores first its internal market and only when it reaches an advanced stage of its development can sell its products/ services internationally. International new ventures, another strategy, on opposite, defend that firms must initialize their international focus in their first years of life (Chetty and Wilson, 2003).

2.4.2.1 The Uppsala Model

Johanson and Wiedersheim-Paul (1975) acknowledge that there are several firms that begin their internationalization process when they still have a small size, developing themselves firstly in the domestic market, agreeing that this process stems gradually. In line, a model of the internationalization process of a company, suggested

by Johanson and Vahlne (1977, 1990) (*cfr.* McDougall and Oviatt, 1996), focuses on the development of the company and its gradual acquisition and growing commitment to external markets. Internationalization is understood as an incremental process, starting with a period of growth and maturation of the domestic market.

In the Uppsala model, firms only initialize their international experience when they have a solid base in domestic market, starting with the exportation mode, firstly to countries where the psychological distance is lower to their home country, moving away to more distant psychological countries over time (Johanson and Vahlne (1977) (*cfr.* Chetty and Campbell-Hunt, 2004)). Johanson and Wiedersheim-Paul (1975) also have the same perspective, stating that, typically, a firm begins to export to similar countries or countries close to its home country, starting this process with the help of agents, instead of establish a subsidiary in the requested country, because an agent doesn't imply a higher resource investment.

The stages of which a company should overcome, can be expressed as:

- firstly, some products exportation;
- secondly, internationalization via an agent;
- thirdly, establishment of a subsidiary for sells;
- and finally, start producing in the foreign country.

The involvement of more resources and the knowledge acquired increase in each stage. However, the stages are not so rigid and delimited, and sometimes it is possible to skip steps if the manager has experience in external markets or if the markets are not so big (Johanson and Wiedersheim-Paul, 1975).

2.4.2.2 Born Global Firms and International New Ventures

Under this perspective, small firms tend to internationalize their business very fast, just one to three years after the creation of the firm. However, this type of companies is called "late starters" because when a company is created and is already internationalized it is called "born global". Through entrepreneurial processes, these firms, the "late starters", develop themselves at regional/ national level for one year (or few more) to accumulate sufficient resources and competences. After this period, the "late starters" are able to expand their activities and capabilities internationally. On the other hand, "born globals" develop entrepreneurship while internationalizing and so they cannot separate their activities from the international context and markets. For

them, the internationalization is not related with an extension of what they have been developing in the domestic market because they start as international companies. They care about what can be improved or created in other markets, as a unique market. While for “late starters” the internationalization is a way to extend or modify ideas, visions and practices, for “born globals” is just a current procedure (Fletcher, 2004).

Chetty and Campbell-Hunt (2004) also describe “born global” firms, stating that they enter into several markets almost at the same time (and in a fast way), when the firm is still young and small and is still only capable to be in niche markets overseas or emerging ones, needed to be integrated in networks to grow rapidly in global markets and regarding new technologies. Knight and Cavusgil (2004) add that “born global” firms are business organizations that from the beginning of their activity (or very close to) seek for better opportunities in other markets, based on knowledge that they applied in the products that they want to sell. Differently from the gradual internationalization of firms, these have their origin outside the domestic market, having a management focus on global markets and introducing their resources in activities overseas.

Similarly, international new ventures are business organizations that, from the beginning of their creation, look for opportunities in several countries, seeking to use their resources and sell their products in those countries, gaining in this way competitive advantages. This type of start-ups is different because they born almost internationally, where the feature is the age of which they go abroad and not the size of the company, being more proactive than firms that pursue the gradual development. This not necessarily means that they invest in those countries with established assets (like foreign direct investment), many times strategic alliances are the solution, so international new ventures can utilize their resources and coordinate multiple value chain activities, whether at production level, technology development, human resources or even marketing (Oviatt and McDougall, 1994).

It is known that firms in the initial stages of the internationalization process don't have abundant resources (financial, human or tangible), but “born global” firms are characterized by innovation, knowledge and skills capable of being successful in external markets. In fact, “born global” firms are linked with innovation and entrepreneurship, approaches essential to make business and open doors abroad, aligned with the intensive knowledge that they hold, making up for the lack of tangible

resources (Knight and Cavusgil, 2004). The acquire knowledge and experience is essential to be successful in new markets (Chetty and Campbell-Hunt, 2004). There are some factors that make more simply and short the whole procedure of internationalization:

- The lower costs and the ease of communication technologies (and so the virtually presence in any part of the world);
- The improvement of transportation;
- The homogenization of many markets.

This also makes possible the discovery of international opportunities and their exploitation to new ventures; even when firms have few resources, they can be successful overseas, not only big and ripe companies. These factors permit many firms, with value and exclusive assets, as new ventures, skip a few steps of the internationalization process, even allowing that internationalization may not occur by stages (Oviatt and McDougall, 1994). The organizational and strategic skills, aimed at a global management and developed since the beginning, also make possible the success out there. So, multinational and big companies are no longer the only ones who succeed when leave the home country (Knight and Cavusgil, 2004). For a systematization of relevant contributions on this topic see Table A2.5 in Appendix II.

2.4.3 The modes of entry of small firms

The world globalization provided the rise of entrepreneurial start-ups with an international dimension from their emergence. Technology-based young firms, with limited resources, that want to go abroad, have important decisions to make about the choice of the mode of entry in other markets. This decision is important for the economic success of the firm in the future. The technology and innovation levels of the firm and the experience acquired in the domestic market are factors essential to the choice of the mode (Burgel and Murray, 2000).

Besides strategic alliances, with a narrow and exclusive network in the area where international new ventures want to commercialize, there are other modes of being international (Oviatt and McDougall, 1994). Two main choices of internationalization by technology firms are the direct exportation and the use of intermediaries. The fact that these firms require expensive costs for the development of the technologies demonstrates that, despite of many opportunities in several markets, it is not advised to

own a subsidiary because frequently firms don't have the capability for that (Burgel and Murray, 2000).

The internationalization can be made by exportation to a few or multiple nations. The manager should have knowledge about the markets and build a network with suppliers in the target country, having the ability to discover where there is a lack of products that he/she wants to sell or even create markets for them (Oviatt and McDougall, 1994). When exporting, it is essential to measure the resources that the firm has and the support that the clients need, because they are physically distant and the firm may not be able to give the necessary support (Burgel and Murray, 2000).

Of course any company wants to be in charge, having a direct export mode or a subsidiary in a market, but an intermediary is a better choice if is well established and reputable in that market. Having other concerns, with a distributor, they have to share profit margins and, at the beginning, that may seem to require more investment for the start-up. However, the young firm can enjoy the relationships of the intermediary and more easily connect with other suppliers and clients, and also learn faster and with fewer costs. In the relationship between the young firm and the agent, the latter have some investments to make, and these may be risky, specialized and irrecoverable. So, the distributor only accepts to be an intermediary for a new start-up if the sales volume is appealing. If the projections are not good, the young company must choose the direct exportation mode (Burgel and Murray, 2000).

Despite the quickly internationalization, there are many reasons that inspire these firms to keep the production at the domestic market, as: economies of scale, the control of the quality of the production or the concentration of knowledge and knowhow (Chetty and Campbell-Hunt, 2004). An important advantage that companies have is the possibility to exchange knowledge to multiple countries, reproducing the valuable knowledge in other countries where they are established, instituting innovation and making this globalization possible, starting a competitive environment (Oviatt and McDougall, 1994).

3. Internship at Porto Digital

This section aims to describe, firstly, the company where the internship was made (Porto Digital) (Section 3.1) and then all the activities developed at the internship (Section 3.2), explaining the importance of each activity for the city of Porto and highlighting the contribution given not only to the several projects developed at the internship but also to the own company.

The internship had the duration of six months and started by focusing the development of the ScaleUp Porto initiative, implemented by Porto Digital. Then, the main tasks were associated with the development of the ScaleUp for Europe initiative, the Start and Scale Week, and other international projects. These initiatives are based not only on the experience of developing projects that can attract people from outside to the city of Porto but also aiming to promote the internationalization of Portuguese start-ups.

3.1 Porto Digital

Founded in 2004 by Porto City Hall, the University of Porto and the Porto Light rail company, Porto Digital is a non-profit organization that aims to support e-government, entrepreneurship, education, innovation, R&D and IT projects. Since 2007, Porto Digital has been supporting the municipalities of the Metropolitan Area of Porto in the development of collaborative digital projects, from projects linked to culture, education, environment, tourism, mobility and intangible heritage, with a technological component. Directed by the City Council, in February 2010 founders of Porto Digital developed a new strategic plan with the purpose of developing the city of Porto as a city based on knowledge, bringing innovation to the core of the town. According to Porto Digital, this strategy contributed to a better vision of Porto, which is now a place where qualified job opportunities are rising and where people feel more attracted to come to the city, in particular, young entrepreneurs, stimulated not only by the culture but also by the new multicultural and international ecosystem that they can integrate.

Porto Digital has several projects and initiatives in process, which focus on cities and people and the promotion of a smart and sustainable development, involving the cooperation of cities and industries. Some themes inserted in these projects and initiatives are related with creating energy, infrastructure and transport solutions that

will impact in cities. The initiatives developed are not only national but also international, as ScaleUp for Europe that tries to promote a network that could support scale-up companies, or ScaleUp Porto, a very recent and innovative mission directly related with the development of start-ups, promoting the innovation ecosystem in the city and the support to their sustainable growth and scale. A more tech feature is also inserted in Porto Digital, with IoT (Internet of Things) solutions and free Internet connections. The aim of Porto Digital is to support innovation and the development of start-ups, understanding what are the biggest challenges lived in the city and trying to find innovative solutions in order to overcome that challenges and create quality of life for its citizens (Porto Digital, 2017).

3.2 Activities developed at the internship in Porto Digital

In the internship, several activities were developed in order to accomplish the objectives proposed at the beginning of the internship and in this report. It is important to emphasise that half of the activities were developed together with Porto Digital team members and the other half of the activities (a), b), c), d), f) and h)) were developed alone with their coordination.

- a) The first activity made at the company was the identification of strengths and weaknesses of the city of Porto, within several subjects as:
 - a. infrastructures of the city;
 - b. companies based in Porto;
 - c. R&D institutes and programmes;
 - d. human resources;
 - e. investors;
 - f. non-monetary incentives given by the Municipality and other institutes;
 - g. public spaces, health and wellness in the city;
 - h. tourism and standard of living;
 - i. cohesion and social innovation;
 - j. events and programmes developed;

The summary of the city's strengths and weaknesses (in some of the subjects mentioned above) are described in Table A3.1 (Appendix III). After this, it was

important (and possible) to analyse what can be improved in the city of Porto to turn the city a place where everyone wants to work, live and invest.

b) The next task was related with the search for the twenty most entrepreneurial cities in the world (Start-up Compass Inc., 2015), identifying their critical success factors and why are they the best entrepreneurial cities, being Silicon Valley, New York, Los Angeles, Boston, Tel Aviv and London on the first places. Other cities of Europe, as Berlin, Paris and Amsterdam are also in the ranking. Then, it was essential to benchmark Porto with these cities. Some of the conclusions were:

- a. The good connections with private businesses to give students hands-on experience;
- b. Incentives for foreign students and professionals;
- c. Big quantity of money spent in R&D;
- d. Efficient and flexible funding networks;
- e. Support provided by some governments in introducing companies to investors;
- f. Production of a diverse array of items (or specialization in just one) that give the cities value added, like aircraft, gas transmissions and distribution equipment, guided missiles, space vehicles and propulsion units, biotechnology, and other types of technology;
- g. Presence of tech giants such as Facebook, Amazon, Google, IBM, Microsoft, Apple or Intel;
- h. English be the official language for some countries or a lot of population talking this language, as their second language;
- i. A central position in Europe and in other parts of the globe;
- j. Significant investment in infrastructures to host start-ups;
- k. Promotion of competitions and meetups;
- l. Others.

With this procedure, it was possible to have ideas that could be used by the Porto City Hall to foster the start-up/ scale-up environment in the city.

- c) It was developed a database with start-up and scale-up companies, incubators, co-working spaces, entrepreneurship support entities, universities, investigation centres and entrepreneurs of the cities of Aveiro, Braga, Coimbra, Lisbon and Porto. This database is useful since it gathers the whole information in one place, being easy to consult and useful for many tasks, such as the following one.
- d) One of the activities developed at Porto Digital was the systematization of the above database that allowed the implementation of interviews, as described next. In order to contextualize the actual situation of the city of Porto in the field of innovation and its support, and also to understand what is being constructed in this domain and what needs to be changed in the city, the interviews were made to 5 incubators, 7 co-working spaces and 4 entrepreneurship support entities, as listed in Table A3.2 (Appendix III). With these interviews, it was possible to understand some aspects, as how many start-ups exist in Porto and why many of them fail, or what are the existent supports to start-ups and to this kind of interviewed companies. Some of the questions and answers given are described below (see Table 1):

Table 1 - Questions made in the interviews and analysis of the answers

QUESTIONS	ANALYSIS OF THE ANSWERS
What motivated the creation of such an entity?	<ul style="list-style-type: none"> - The creation of an infrastructure to support employment and entrepreneurship, helping young entrepreneurs/ finalists gaining more opportunities to work with their own projects (incubators and entities); - The lack of spaces of this kind and the lack of support for the community (co-working spaces).
How many start-ups are currently using your services?	<p>It varies significantly from company to company, some have around 200, others around 20-50 and others do not reach 5 start-ups.</p> <ul style="list-style-type: none"> - Incubators tend to have a higher number while co-working spaces often work with individuals rather than with start-ups already formed. <p>Total: 523 start-ups are being supported by the companies interviewed, however some interviewees did not provide this</p>

	<p>statistic. This means that the city of Porto supports a higher number.</p>
<p>What are the main areas of activity of the companies that you deal with?</p>	<p>In general, all of them are related to creative industries:</p> <ul style="list-style-type: none"> – ICT, as software (69%); – Architecture, design and other areas related to art (such as photography, illustration, crafts, audiovisual) (62.5%); – Marketing and Communication (31%).
<p>What is the biggest difficulty that start-ups that fail face?</p>	<ul style="list-style-type: none"> – Lack of management capacity and knowledge in the economic-fiscal and market levels (64%); – Lack of financial capacity of the start-ups (54.5%); – Lack of support and follow-up to these companies (27%); – Immaturity of their managers/ team (18%).
<p>What kind of support do you offer to the companies?</p>	<ul style="list-style-type: none"> – Mentoring programmes (incubators and entities); – National and international networks; – Access to infrastructures and other conditions (incubators and co-working spaces); – Support at various levels, such as investment demand, product development, innovation programmes, legal services (incubators).
<p>What kind of support would you like to receive as an entity that promotes and supports business growth?</p>	<ul style="list-style-type: none"> – Financial support (66.67%); – A greater connection with the City Hall of Porto and other key entities of the city of Porto (40%); – More projects for the clients (33%).
<p>In your opinion, what needs to be improved in the city in terms of support of new businesses?</p>	<p><i>(Answers in order of the most pronounced)</i></p> <ul style="list-style-type: none"> - A greater dissemination of the city of Porto and the companies; - A greater communication with other cities, in order to attract more workers to Porto; - More spaces to allocate start-ups and offices, and more support in the search for them; - More initiatives for start-ups, creating more and better conditions; - A greater connection among the various entities of the city; - A reduction of the rents in the centre of Porto and more investment in other areas; - A better traffic and a dense transport network with better connections to the more distant areas.

Source: Own elaboration.

The answers were very useful to analyse the actual situation of the region of Porto and were very important to Porto Digital in order to understand what is necessary to improve the environment of these entities and start-ups.

- e) A report about the ScaleUp Porto initiative was developed, with the following contents:
- a. what is or will be the ScaleUp Porto (the concept);
 - b. who will be involved (since the Porto City Hall and the Metropolitan Area of Porto, scale-up and start-up companies, universities and university associations, support agencies for innovation and financing, business angels and investors, research centres, consulting companies, co-working spaces and incubators, big companies, and national and international networks);
 - c. the target of the initiative (for example, start-ups with profile to scale, foreign entrepreneurs, young entrepreneurs, university students, scale-ups, cities);
 - d. goals of the initiative;
 - e. concrete activities to be developed;
 - f. communication plan (for example, in the social networks and blogs of Porto Digital and other related institutes, a rubric in a technological magazine or on a television programme, promotional videos, and others);
 - g. methodology (for example, the interviews made and described above);
 - h. incentives (for example, tax advantages or subsidies);
 - i. deadlines.

With this, a more detailed and organized strategy can be drawn.

- f) Some webinars were analysed to draw ideas that could be potentially replicated in Porto. One example was the webinar “Shared Mobility Services in Cities” (GrowSmarter, 2016) with presentations and discussions for lighthouse cities, industry partners, follower cities and city interest group members. The webinars were about Smart Cities, sustainability, innovation and smart solutions in energy, infrastructure and transport fields.

- g) An Innovation Guide was also created, like a cookbook. The goal was to develop an easy to read, interesting and enlightening book for collaborators of the Porto City Hall that, for several times during work meetings, didn't understand some terms or themes discussed. There are 6 main categories and, in each one, several themes were inserted (in more than one many times). The themes (20 in total) have a definition, implications, facts and curiosities, an example of what already exists in Porto, and other practical cases/ examples in Portugal and abroad. Finally, there are also other themes, with a very small description, which fit into one or more themes (32 sub-themes) (see Table A3.3, in Appendix III). Some presentations of the main themes were also done in the company. This Guide has already been requested by foreigners.

- h) It was requested to search for international conferences, events, open days and so, in 2017. The goal for this task was to look at them and choose the most interesting for Porto Digital to participate. Events in Portugal with international character, as the case of the famous Web Summit, were also searched. The most important information of the events, as, for example, the papers submission, the local of the event or the theme associated, were inserted in a file developed to facilitate the organization for the company.
 - a. A paper about ScaleUp Porto was started for further submissions, where a contextualization with a brief literature review can be read, as well as the concept/ definition, importance and evolution of the ScaleUp Porto initiative. The feedback of previous Start and Scale Weeks was written.

- i) A new model of implementation of Hackacity was asked to be proposed for this year. Hackacity is a hackathon with the purpose to use big data at the same time that participants develop solutions to improve the life at the cities. This challenge has the duration of 24 hours and needs to be answered according to some challenges launched. The first Hackacity was in 2015, at Porto, with 40 participants and 10 solutions about mobility, environment and tourism. The second was in 2016, with a multi-spatial participation (6 cities/ 4 countries –

Porto (Portugal), Olinda/Recife (Brazil), Santander (Spain) and Amersfoort/Utrecht (Netherlands)), where there were 94 participants and 22 solutions about mobility, environment, tourism and security (Hackacity, 2017). The goal for this year was to understand how the contest can involve cities, citizens, companies and multidisciplinary teams, reformulating the structure and creating a concept that involves more intensely the necessities of the cities, not discarding the technological character.

- a. Firstly, a report with the proposal for this year was made, with:
 - i. an introduction;
 - ii. a clarification of the concept;
 - iii. the mission and goals of the contest;
 - iv. the team of the event;
 - v. the advantages/ value added for the participants;
 - vi. the sponsors involved;
 - vii. the differences between this edition and the last two (for example, the fact that more cities will be invited or the desire to foster the development of solutions that meet the specific needs of each city);
 - viii. the profile of the participants;
 - ix. the themes of the challenges;
 - x. a list of the possible cities to be involved;
 - xi. an agenda;
 - xii. a list of all necessities of the event (as logistical, catering, extra activities, promotion);
 - xiii. a task line;
 - xiv. a list of every materials and human resources that could be needed;
 - xv. a sponsor's pack;
 - xvi. a description of how can cities collect their needs and how can they show their challenges to the participants.
- b. Next, it was necessary to make a schedule of what will be needed to do in each month, for example: when to start to contact the cities and the

partners, their confirmations, when to start promoting the event, determine the venue and the date, etc.

- c. To contact the cities, it was necessary to develop some templates with the script of the phone call and e-mails that were needed to exchange in each step (invitation, requests, follow ups, information). At the same time, an excel with some possible cities to invite was elaborated (from Latin America to all Europe) as well as their contacts, what was already requested for the event, deadlines of the requests, etc.
 - d. A survey was developed to understand the perception of the participants, cities and sponsors about the event, to know their opinion about the city's data (quality and quantity), if the cities provided all important information to the participants, the quality of the solutions developed, etc.
 - e. Finally, some presentations were built to present the new Hackacity model to Porto Digital (to be accepted), and to send to the cities and participants.
- j) Start and Scale Week is a project inserted in ScaleUp Porto with the purpose of promoting the ScaleUp Porto initiative, creating a global network and streamlining the city of Porto as a city of innovation and entrepreneurship. It occurred this year from 28th of May to 3rd of June in Porto (ScaleUp Porto, 2017). To prepare this week it was essential to look for ideal places in the city to allocate the event and search their availability for the different activities that happened in each day. It was defined the activities to occur during the week, as masterclasses, Hackacity Porto, ScaleUp for Europe/ City Network, parties, as well as the responsible person for each activity. The team and partners were defined and an agenda began to be drawn.

- k) The European Commission launched a contest ⁴ promoted by two initiatives: Innovation Radar⁵ and Startup Europe for Growth⁶. In order to apply to this funding opportunity, Porto Digital was developing a paper to submit. The document is divided in:
- a. a vision, explaining the situation of start-ups in Europe;
 - b. an explanation about ScaleUp for Europe initiative, as the initiative that Porto Digital will expose to the challenge:
 - a. ScaleUp for Europe is an initiative that follows the ScaleUp Porto Manifesto engagement where the support to scale-up companies is the core, promoting the strengthening of global networks. This initiative has the purpose to make scale-ups more informed about the cities and their whole environment, helping their integration in those cities and encouraging the internationalization. The goal of the initiative is to help entrepreneurs achieving a sustainable growth, having success, increasing their sales and becoming more reputable. The city of Porto can gain with this whole network, obtaining a vision at European level and achieving local development (Scale Up for Europe, 2017);
 - c. the commitment, ambition and goals of the Portuguese initiative;
 - d. the activities that Porto Digital proposed to carry out (within categories from networks and synergies, to mentorship programmes and financial supports, and communication or job search);
 - e. the expected impact at several fields as well as the probable obstacles and barriers of the initiative;

⁴ The scope of the contest was to demonstrate some actions that could help start-ups and potential entrepreneurs to achieve success in the market and expand in international levels, promoting the creation of new businesses with high potential growth through synergies with European innovation ecosystems. - Information obtained from the website of the European Commission ('<http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/ict-32-2017.html>').

⁵ Tries to identify innovations with high potential, aiming to support the innovators with a group of specific actions and orientations that intend to help them to be successful in the markets. - Information obtained from the website of the European Commission ('<https://ec.europa.eu/digital-single-market/en/innovation-radar>').

⁶ Aims to enhance the creation and growth of entrepreneurial businesses in European Union. - Information obtained from the website of the European Commission ('<http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/ict-32-2017.html>').

- f. a workplan, with some titles to fulfil and to be committed, in several areas as: project management, foster cross activities/ tools, rise of the ScaleUp initiative, portfolio and community boost and marketing @ScaleUpForEurope (dissemination and exploitation);
- g. a timeline.

It is also important to mention that this initiative has the contribution of different partners from different countries as Netherlands, Finland, Italy, United Kingdom and Denmark.

- l) The last task of the internship was related with the participation in “The European Capital of Innovation Award” (3rd edition)⁷. It was necessary to prepare the application for the present year:
 - a. It was important to collect samples of the last participant cities, as the case of Amsterdam (winner of 2016), Torino and Paris, to understand what is necessary to demonstrate to win and what should Porto Digital do.
 - b. A file was created with all developed projects in the city of Porto, since the 1st of January 2016, in the categories of:
 - i. social innovation,
 - ii. mobility,
 - iii. governance,
 - iv. environment and sustainability,
 - v. entertainment and tourism,
 - vi. health,
 - vii. education,
 - viii. security,
 - ix. technology, and
 - x. other projects and initiatives developed by the Porto City Hall and by Porto Digital (as ScaleUp Porto).

⁷ The European Commission will give the award to the city that develop more innovative initiatives and where citizens are involved and empowered, being the most able to solve problems, enhance the quality of life of the society and improve the attractiveness of the city. - Information obtained from the website of the European Commission (<https://ec.europa.eu/research/prizes/icapital/index.cfm>).

Other infrastructures could be mentioned on the application, as events, festivals, Port of Leixões, universities, institutes and other innovations in the city.

As explained at the beginning of this chapter, the activities developed during the internship were essential to the company and to the many projects and initiatives involved, particularly the ScaleUp Porto. The own concept of the initiative was rethought. This initiative can now take advantage of all the research, the collected information and the ideas developed for the projects and for the city. The help given in writing the papers to participate in the several contests and programmes was essential, as well as the help in the organization and reformulation of the events/ projects. The search for more events and projects that could fit in Porto Digital projects was an important task, so they can be involved in more activities that can bring them advantages, as funds and networks. The city can also take advantage of the activities developed, especially in what concerns what can be improved in the city, understanding the actual situation of Porto in the start-up environment through the interviews, for example, or even with the Innovation Guide that made the workers more aware and informed.

4. Methodology

Besides the activities developed in the internship at Porto Digital, described in Chapter 3, and in order to have a complement to answer the goals proposed to this report and investigation, some interviews are suggested to be made. In this chapter, the methodology used to gather all the information needed to answer the research goals, namely the identification of critical success factors and failures of the city of Porto and the understanding of the new concept – Scale-up – and its determinants and characteristics, as the internationalization process, will conduct to several conclusions about related themes of the internship.

The methodology used in this internship report is qualitative, based on a theoretical approach: pragmatism and generic qualitative survey. This approach is focused on the practical consequences and useful applications of what have been learned in the internship. This type of methodology requires interviews, essentially to start-up and scale-up companies, to answer some questions about the subject in study, enriching the report with more knowledge and detail about the advantages of being in Porto while start-up/ scale-up company, the difficulties of scale and the motivation and obstacles in internationalizing. The interview method used was half structured, incorporating fixed elements but having the flexibility to include other elements or themes of interest during the interview, facilitating the analysis, quantification and comparison of data. The adopted strategy is planned design with intentional sampling once the interviewees are pre-selected in order to provide more information to the topic under study (Patton, 2015).

Therefore, for a deeper interaction with the companies and in order to gather more detailed information, the interviews were executed based on a previously prepared script (see Appendix III). The structure of the script allows a systematization of the information and a comparison of the answers given by the different interviewees. As said before, the interviews, made to start-up and scale-up companies, were conducted with co-founders, CEO's, Business Developers and Managers of the companies. However, interviews can have a weakness related to the fact that, with precision, the outcomes correspond only to the sample collected and cannot be generalized if the sample is not extensive (Hill and Hill, 2000). Although this investigation took into account only 17 companies, it is possible to draw some conclusions and explore in a more depth way the topic under analysis, which will help to better understand the

characteristics of start-up and scale-up companies and the whole process of growing and internationalizing. The research has gone through a few steps:

- 1) Elaboration of the script of the interviews;
- 2) Conducting the interviews (recorded with the authorization of the interviewees and later transcribed);
- 3) Reading of the collected material and organization of the answers;
- 4) Revision of the main objectives and theoretical arguments analysed in this report;
- 5) A mapping exercise with all questions and answers given by the interviewees, as a systematization of the information to interpret, compare and take conclusions.

The selection of the interviewees was intentional. After a deep research about the start-up and scale-up companies born in the city of Porto, based on a database of Porto Digital, incubators of the city of Porto (as UPTEC) and a research in social networks and newsletters; and after the contact with 45 companies, 17 companies volunteered to be interviewed, all of them already internationalized (see Table A3.4, in Appendix III). Many of the companies interviewed have a great interaction and collaboration with Porto Digital in several actions and activities in the city. It is possible to even highlight some awards that some of them received, as 7Graus,⁸ Adclick⁹ or Nonius¹⁰.

⁸ Deloitte 2015 Technology Fast 500™ (EMEA).

⁹ Deloitte 2014 and 2015 Technology Fast 500™ (EMEA); FAZEMOS BEM (We Do Well) 2015 by a Portuguese newspaper “Jornal de Notícias”; TOP Exporta 2013 by Santander Totta; SME Excellence 2013 and SME Leader 2014 by IAPMEI; Network SME Innovation 2015 by COTEC.

¹⁰ SME Leader 2014 and SME Excellence 2016 by IAPMEI; Exports & Internationalization Awards 2016 by Novo Banco and Jornal de Negócios.

5. Analysis of interviews

Before beginning to analyse the answers given by the companies to the conducted interviews, by main topics, it is important to notice some facts as:

- The year of foundation of the companies is diverse, as well as the number of employees and the area of activity (within the technology field), from marketing to automotive, internet and software, e-commerce, web security, creative technology, broadcast, data management or networks (see Table A3.5, in Appendix III).
- More than half of the companies has 20 or less employees, with the interval 11 to 20 as the most frequently identified (see Table A3.6, in Appendix III). Dividing into micro, small and medium companies: there are 4 micro companies (0-10 employees), 10 small companies (11-50) and 3 medium companies (51-200).
- Some of the companies are not located in the centre of Porto, being instead in near locations such as Maia or Matosinhos.

5.1 Characterization of the city of Porto

The interview starts by focusing on the characterization of the city of Porto in order to understand if this city has the capacity to become a booster for scale-up companies. The strengths and weaknesses (positive and negative points, or points to be improved) of the city were identified by the interviewees as well as the opportunities and threats that the city can take and face. In every composition of the SWOT analysis different answers were given (see Table A3.7, in Appendix III).

In almost every interviews, the fact that Porto has excellent universities and qualified persons was mentioned as the biggest strengths (as well as in Section 3.2 a), the strengths searched during the internship). The whole region around Porto is well supplied by universities, as emphasized by B-Parts:

“In a radius of 60km we have 8 universities, or something like this, from Braga to Aveiro, or even in 100 km, to Coimbra. The access to talent is good, it is easy and it is of quality.”

(B-Parts)

The quality of life, the existence of incubators, the recognized airport and the low costs compared with other cities (as Lisbon or in Europe), are other main strengths highlighted by several companies (as well as in Section 3.2 a), the strengths searched during the internship):

“We have a good lifestyle, that is, we work hard but the city can also welcome the fun, the beach, go boating, ride a bike, have parks, so do not be an industrial city, not be a city where you only work and then you have a place where you sleep. It is a city with much more life than that.”

(Mindera)

“At the time, in the first year, we did not have any investment or even resources to start. Porto allowed us to live without great resources during the first year. So, that is a big advantage.”

(Widetail)

Other interesting strengths mentioned were the following:

“I think that there has been an interesting investment in innovation and technologies.”

(Adclick)

“I think that in this technological area the market in Porto is quite good and healthy.”

(Mindera)

“I think Porto is very well located at the European level and we are here between the United States and Europe.”

(Veniam)

One of the strengths appointed was the fact that there is a good network of transports in the centre of the city, despite the fact that the same does not happen in other areas:

“I think there is still something to do, especially about the connection with the satellite cities of Porto and all the suburban areas of Porto. The city itself, its

access, I think they are relatively well served in terms of transport, but I cannot say the same about the connection to these suburban centres, dormitory cities.”

(7Graus)

The human resources allocated to the city are not enough, and this was the weakness most selected by the interviewed companies. Two other weaknesses frequently mentioned were the allocation of firms and persons in the city: lack of spaces and, consequently, the increase of the prices.

Although the city has not a big visibility outside (one of the most listed weaknesses and one of the weaknesses appointed in Section 3.2 a) - in the internship description), according to the experience of the interviewees, one of the biggest opportunity is the fact that more and more foreign companies are located in Porto and this requires more talent, and that is also the main reason why the talent available in the city is not sufficient. Another opportunity, the most prominent and highlighted for more than half of the respondents, was the gain of visibility associated with tourism in Porto, contradicting one of the main weaknesses. So, about the visibility of Porto, several comments were made by the companies:

“In what regards technology, Porto is the place to be: the excellent start-ups that we have, the fact that the only billion-dollar start-up is from here, the fact that the best technologies are from here. Giving a little more emphasis to what really is from here or what started here is always good to promote out there.”

(HypeLabs)

“Porto is a city that is fashionable and then you start to get foreign people to come to work in Portugal, resources with a high level of experience, which is very interesting.”

(Streambolico)

Other interesting opportunities mentioned by the interviewees were:

“We have a good ecosystem to test new business models, to test new products in the area of tourism as well as in the area of wines, so we have an excellent region to develop business related to the area of wines and export this knowledge, export this work to other regions of the globe, whether in Chile, California or France. So, once again, we have opportunities to develop and we

have all the stakeholders to develop some case studies or some projects and manage to scale them to other geographies.”

(AddVolt)

“We are in the same time zone as London, which is not bad at all, that is, the meetings always have to start from noon with New York but it does not make any difference, during the afternoon with San Francisco, do not make much difference, then we can be quite global from here.”

(HypeLabs)

Finally, two of the most declared threats were related to the city of Lisbon. The competition with Lisbon is large. Lisbon is, according to the interviewees, a city with a great visibility overseas and is able to compete with other cities. Together with this, when a company decides to go to Portugal, most of the times, it will be located in Lisbon.

5.2 Characterization of the company and scaling-up process

The first question of the second theme was developed in order to understand if the interviewed companies are start-ups, scale-ups or potential future scale-ups. After this nomination, it is interesting to analyse the answers of the other questions and understand and compare the differences between the different phases of the companies. To be considered a scale-up, it is necessary to:

1. Have a sustained annual average growth of employees or a turnover of more than 20% per year for three full years (Coutu, 2014);
2. Be in a phase after the start-up phase, where the company intends to enter in new markets, increase its revenue and number of employees and add value to the own company through cooperation and connection with other companies/entities in those markets (as mentioned in Chapter 2.1.2, see Onetti (2014), SEP Monitor (2015) and the World Economic Forum (2014)).

The following table shows the characterization of the companies according to their answers to the sentences (see Table 2):

Table 2 – Answers by company, characterization of the companies and additional considerations

COMPANIES	1.	2.	PHASE	CONSIDERATIONS
7Graus	Yes	Maybe	Potential future scale-up	Growth in turnover (400% in the first years; stagnation in the last years). Growth in the number of employees below 20%.
Adclick	Yes	Yes	Scale-up	Growth in turnover (1500% in the first years; 20/25% in recent years). Growth in the number of employees.
AddVolt	No	No	Start-up	
B-Parts	Yes	Yes	Scale-up	Growth in the number of employees.
GEMA	No	Yes	Potential future scale-up	Growth in the number of employees and market access.
Helppier	No	No	Start-up	
HypeLabs	No	No*	Start-up	*Although the company has presence in many countries, it is not profitable yet.
Infraspeak	No*	Yes	Potential future scale-up	*Although the company has been growing by more than 200% in turnover, it does not have 3 years yet.
Jscrambler	Yes	Yes	Scale-up	Growth of at least 100% per year.
Mindera	No*	Yes	Potential future scale-up	*Although the company has growing in the number of employees, it will only make 3 years in September.
MOG	Yes	Yes	Scale-up	Growth of more than 20% of turnover between 2008 and 2011.
Nonius	Yes	Yes	Scale-up	
OSTV	Yes	Yes	Scale-up	Growth in turnover.
Streambolico	Yes	Maybe	Potential future scale-up	Growth in the number of employees.
TOPDOX	No	Yes	Potential future scale-up	
Veniam	Yes	Maybe	Potential future scale-up	
Widetail	Yes	Yes	Scale-up	

Source: Own elaboration.

It is essential to mention that, in the second sentence, after the interviewees had thought about the turnover and the growth in terms of employees, most of the answers were given according to the intention to enter in new markets. It is relevant to note that there are no numerical limits in the second sentence. Hence, when a company is having an increase in the revenue and in the number of employees but is still in a few countries (1 to 3), the answer “maybe” was recorded, although they show intention in increasing the presence in other markets. For a better comparison between companies and their characterization, this assumption was considered in order to distinguish which companies are in many markets and which are still in a few.

The answers were not equal in both sentences for some companies. The following categorization was considered:

- When the companies have 2 “no”, the company is still a start-up;
- If the company has two “yes”, it was classified as a scale-up;
- If the company does not meet the first requirement (no + yes) or does not meet totally the second one (yes + maybe), the company is a potential future scale-up with good opportunities to scale.

It is important to notice that a “yes” in the 1st sentence and a “no” in the second one does not happen.

After this exercise, the final output was: 3 start-ups, 7 potential future scale-ups and 7 scale-ups. This means that there are 7 companies that are no longer start-ups but have not reached yet the scale-up status. However, even the companies nominated as start-ups can be potential future scale-ups eventually; the companies nominated potential future scale-ups are more close to become a scale-up company in the next years.

Comparing the nomination with the year of foundation of the companies, the companies named “scale-up” have always more than four years of existence, having the majority more than seven years. On the other hand, start-ups do not have more than three years old and the potential future scale-ups have between 2 and 13 years, according to the companies interviewed (see Table A3.5, in Appendix III).

Many of the interviewees do not had an agreement in both sentences and this shows the difficulty of operationalizing the concept since sometimes even the interviewees did not know the exactly definition of the word “scale-up”. However,

many of them made a contribution after being inquired if they are a scale-up, for example:

“GEMA is no longer considered as a start-up, we have been in the market for 10 years, we have already reached our cruising speed. We consider ourselves as a scale-up because we are already at a stage where we are a scalable company, we are already a company that has produced a lot and is already able to scale today and plan a scale for tomorrow.”

(GEMA)

“Yes, our products are scalable / replicable.”

(Infraspeak)

“If we do not go into detail in the criteria, I think that MOG fits in the concept [scale-up], so I have the idea of being the concept. By the nature of the company, it remains a relatively young company, focusing on this area of new technologies, with a focus on highly qualified human resources, with a relatively interesting growth dynamic, both in terms of employees and in turnover.”

(MOG)

“What differs from a start-up to a company in the next phase is that the business has become sustainable, has entered a well-defined direction and there is no explosive growth from the point of view of resources, it may be from the revenue point of view because it becomes scalable but not from a resource point of view.”

(Streambolico)

“TOPDOX is still a start-up and is not a scale-up. Although it is already a "mature" start-up with about 3 years, it still cannot be considered a scale-up. We only recently found the "product/ market fit" and it is starting to grow in the market found.”

(TOPDOX)

“The technology that we have can already be replicated in other countries, we have proven that; that is, we proved that our technology worked outside of our comfort zone. We first made it in Asia and then headed to the United States, and we actually have our technology working there.”

(Veniam)

After these testimonials, it is possible to make an analysis of what the interviewees think that a scale-up company is or needs to have/ be:

- Be in the technological area;
- Be moderately young yet;
- Be sustainable;
- Do not have a huge growth in resources;
- Grow in terms of markets' access;
- Have growth in turnover, revenue and employees;
- Have to know exactly where and when to be;
- Have products/ technology that can be replicated in other markets;
- Have talent with high know-how.

After the nomination of the companies into the theme start-up/ scale-up, it was asked: (i) what were the main characteristics of the companies that are making/ made possible the scale-up process and international environments; and (ii) what still can be improved in order to continue to grow. About the main positive features of the companies that are making/ made promising this whole process, there were more than 20 different answers (see Table A3.8, in Appendix III). Having the capacity and competences to manage a company is, according to the interviewees, one of the most important characteristics that a company needs to be successful and scale, following the prior international experience of the founder (as in Chapter 2.4.1, Sapienza *et al.*, 2006). The companies that made these sentences are only potential future scale-ups and scale-ups, according to the nomination previously made.

Many of the features are related with the founders' expert and experience, so it is possible to observe that they are an essential element in the company, together with the talented workers, the connections with partners and other agents (that support the

companies in many ways: *“Opportunity to work with some partners/ clients who have taught us a lot.”* (AddVolt); *“In addition to being present in their Marketplace, our solutions are being developed with their feedback and support. This strategic partnership has allowed us a faster and more efficient “go-to-market” in the B2B business market.”* (TOPDOX)) (mentioned in Chapter 2.4.3, Burgel and Murray, 2000), and the acceleration programmes (mentioned in Chapter 2.3.3, Pauwels *et al.*, 2016) and incubators that help start-ups growing (mentioned in Chapter 2.3.3, Aernoudt, 2004; Carayannis and von Zedtwitz, 2005):

“In the acceleration programmes that we have been, we got a great network of contacts, and also it gives us a lot of credibility to be in a programme and always have contact with clients and investors.”

(Helppier)

So, the access to a range of contacts inside and outside the country is an important element (mentioned in Chapter 2.3.4, Coviello and Munro, 1995; Johnsen and Johnsen, 1999; Kao, 2009), along with the products themselves. The technology, the innovation and the differentiation of the products/ services offered are important factors to be able to compete (mentioned in Chapter 2.4.1, Sapienza *et al.*, 2006). Finally, the fact that a company intends to be international since the beginning and the cultural variety inside the company are other facts mentioned in the interviews as positive factors of the companies.

Relatively to the second part of the script for the interviews, about what can the companies improve or what are the less positive factors of the companies, there is also a great variety in the given answers but there are no outstanding answers. The four more frequent answers were:

- Challenge / difficulty of scaling the company:

“Essentially, the biggest challenge we still face is actually the scale-up of the company: being able to pick up all the products that we have and distribute them well, set up a good platform, a good distribution network, have partnerships with companies that sell our products, so I think the biggest challenge we have is this.”

(GEMA)

“Everything that involves creative industries has difficulty in scaling in this way, because multiplication, entering in other markets or producing more implies more people, more inputs, more raw material or more time and, therefore, we are not by nature in a position like this.”

(OSTV)

- Lack of financial capacity (HypeLabs; Infraspark);
- Long business and sales processes with large companies and B2B businesses (AddVolt; Helppier);
- Need to have an organizational structure:

“To continue to grow it is necessary to have some organizational structure (...) has only to do with a matter of reorganization of the company (...) when we are already on this scale and if we want to continue to climb the scale, the organization itself must be thought differently, the structure of the teams, the way the teams work, there may have to be a need for some hierarchy that we do not currently have.”

(7Graus)

“These growth pains from moving from 4 people to 6, to 60, to 65, who are not all in the same place, and there is no fixed organizational structure. There is no that hierarchical question that exists in the other companies where you have the CEO up there and then you have the different departments and then you have the people below. Not here, there is a constant communication between the CEO and the administrative part or the financial part or the communication part and so on.”

(Veniam)

Some of the other answers gathered for this part were:

- Extremely competitive area: *“We are in the field of e-commerce, creating online stores, which is an area that is extremely competitive, there are a thousand and one solutions like ours, we try to differentiate ourselves but it is always difficult.”* (Widetail);
- Investors’ distrust in a new company: *“At the investor level there may be some mistrust in a young company.”* (Adclick);

- *“Lack of experience of company founders”* (Infraspeak);
- Lack of maturity: *“Lacking maturity, is the downside of making this bet”* (Streambolico);
- *“Lack of networks”* (Infraspeak);
- Lack of volume: *“We lack volume, that is, we lack more suppliers and we need to have a greater recurrence than we have today at the level of customers; passes through both sides of the market.”* (B-Parts);
- *“Size of the company”* (Nonius).

5.3 Internationalization process

Focusing on the internationalization process of the companies, to the question “At what age did your company start the internationalization process?” the answers given are in Table A3.9, in Appendix III. It is possible to understand that the majority of the interviewed companies started their activity already internationalized (10 responses with “Instantly”). Of the remaining 7 respondents, 3 had a rapid internationalization process (during the first year of activity) and 4 had a slower process (after some years of activity).

The procedure of the internationalization process can be named according to these answers. It is highlighted three categories: born global companies (the company has born internationalized - mentioned in Chapter 2.4.2, Chetty and Campbell-Hunt, 2004; Fletcher, 2004; Knight and Cavusgil, 2004), international new ventures (the company initiate the internationalization process very soon in the first year of activity – mentioned in Chapter 2.4.2, Oviatt and McDougall, 1994; Chetty and Wilson, 2003) and incremental mode (1st - conquest of the domestic market; 2nd - export; 3rd - through an agent; 4th - with a subsidiary; 5th - production abroad - not being mandatory to go through all these steps - mentioned in Chapter 2.4.2, Johanson and Wiedersheim-Paul, 1975; Chetty and Wilson, 2003). It is possible to indicate that there are:

- 3 companies that are international new ventures: B-Parts, Infraspeak and Veniam;
- 4 companies that adopt the incremental mode:
 - o OSTV (1st and 3rd steps)
 - o AddVolt (1st, 2nd and 3rd steps)

- o GEMA and Nonius (1st, 2nd, 3rd and 4th steps)
 - However, none of them has the 5th step achieved (the production abroad), conclusions that will be given further ahead;
- 10 born global firms: 7Graus, Adclick, Helppier, HypeLabs, Jscrambler, Mindera, MOG, Streambolico, TOPDOX and Widetail.

So, the majority of the companies is born and starts immediately to interact with others countries. The area of activity of the companies is distinct and the age of internationalization has nothing to do with the activity area of the companies. Even because there are companies with the same area that instantly internationalized and others that did not. The nomination of the companies is also excluded from comparison once, for example, the companies that adopted an incremental mode are diversified in terms of maturity (start-up, potential future scale-up and scale-up).

The second question in this theme was about the motivations regarding the internationalization decisions and the opportunities that the companies see abroad. Although the answers given were diversified, the small size of the Portuguese market was the most common answer (given 10 times: 7Graus, Adclick, B-Parts, HypeLabs, Jscrambler, Mindera, MOG, Streambolico, TOPDOX, Veniam). The location of the largest potential customers (or simply more customers) was the second more frequent answer (AddVolt, Helppier, Infraspeak, Jscrambler, Nonius, OSTV). In other words, the fact that the Portuguese market is so small provides the need to look for more clients abroad:

“This is all very natural. It is a small market but in our case it is still more than that, what we do is very innovative and, therefore, we have to look for where in the world are the early adopters of the kind of technology that we produce and Portugal is far away of being the early adopter of this type of technology. Simply there was no demand.”

(Jscrambler)

Many of the other answers were given twice or thrice, as:

- The desire of growth: GEMA, Veniam;

- Financing/ acceleration programmes abroad: Helppier, HypeLabs, Widetail;
- Greater possibility of insertion in an important network or simply searching for networks (mentioned in Chapter 2.4.1, Fletcher, 2004): MOG, Nonius, Streambolico;
- Lack of demand in Portugal: AddVolt, Jscrambler;
- Possibility to work from Porto: 7Graus, Adclick;
- Search for investment/ financing, for a stronger market presence (related to other responses given that was the search for higher financial returns): AddVolt, Veniam;
- Search for larger markets (related to the fact that the Portuguese market is small) (mentioned in Chapter 2.4.1, Fletcher, 2004): AddVolt, Infraspark;
- Search for recognition, opportunities, greater confidence by established companies, greater mutual aid: HypeLabs, Streambolico.

It is possible to observe that the answers given more times, “small size of the Portuguese market” and the location of customers, were given by start-ups, potential future scale-ups and scale-ups, so there is no connection with this nomination. An interesting fact is that, for example, the companies that looked for financing programmes or important networks are now scale-ups (being one a potential future scale-up yet).

After understanding the motivations of the companies when going abroad, the next question was asked in order to understand to which countries these companies are more internationalized and the reasons involved with that. Some respondents told only the number of countries where they are or the continents. So, in Table A3.10, in Appendix III, are only the countries that were specified. It is possible to recognize that USA is the country more frequently mentioned (10 times). However, Europe (as a continent) was stated the same times (10), where Spain and Germany are the more mentioned countries. Latin America and Asia are regions that start to be more sought, especially Brazil and India. Africa is a continent that does not have much presence.

Still about the Table A3.10, it is important to emphasize the fact that, for Africa and Latin America, the reason more frequent was about the similarity of the culture

between the markets and Portugal. The reason “Markets with great potential” was the most said for the countries in North America and Asia. In Europe, the fact that the markets chosen have large dimensions was observed.

In general, and not analysing by countries, the most frequent reasons of the selection of countries were:

- Country that is receptive to new technologies and where they are easily adopted: Jscrambler, TOPDOX, Veniam;
- Culture of the countries being close to the Portuguese culture (mentioned in Chapter 2.4.1, Johnsen and Johnsen, 1999): 7Graus, GEMA, Infraspark, Widetail;
- Customers who find them over the internet: B-Parts, Helppier, Jscrambler;
- Markets with greater potential: Helppier, HypeLabs, MOG, Veniam;
- Networks already established in those countries: Infraspark, Mindera, MOG, OSTV;
- Participation in acceleration/ financing programmes or European projects: Helppier, HypeLabs, MOG, Widetail.

Still, other answers were given, although less often:

- Large size of the market: B-Parts, MOG;
- Location of a large part of technological companies and with greater economic power: Helppier, HypeLabs;
- Market factors (such as legislation, payment methods): AddVolt, Widetail;
- Markets with capital: HypeLabs, Veniam;
- Mature markets: B-Parts, TOPDOX.

As Loane and Bell (2006) stated (in Chapter 2.4.1), most of the small firms do not look for countries geographically close when deciding to expand their business. In 17 companies, only one (Adclick) mentioned this as reason for choosing the country.

Finally, it is essential to highlight the following facts concerning the question in analysis:

- The countries/ continents to which the companies decide to internationalize firstly are: Europe (3 times mentioned: Adclick (Spain and France), HypeLabs (Poland), MOG), USA (2 times mentioned: Mindera, Veniam), Brazil (2 times mentioned: 7Graus, GEMA) and Chile (1 time mentioned: Widetail);

- 9 of the companies mentioned their presence in Latin America and Spain, which means that they choose to go abroad to countries culturally close (mentioned in Chapter 2.4.1, Johnsen and Johnsen, 1999);
- The same reasoning can be made to the reference to countries as Spain and France, where 6 companies have located activity, choosing to be geographically close¹¹;
- The number of countries where each company has business grow according to the evolution of the nomination of the companies: start-ups are in less countries than scale-ups, and the majority of the scale-ups are in more countries than potential future scale-ups;
- Relatively to the foundation year (see Table A3.5, in Appendix III), the companies with 7 years or less are in less than 10 countries (with one exception) and the companies with more than 7 years are in a wide range of countries (with two exceptions being in 4 or 5 countries);
- Many companies declared that the majority of their business is made abroad (in accordance with the previously mentioned factor of the small size of the Portuguese market). Some of the testimonials are below:

“We still have some business in Portugal, but it is very few, considering that the national market represents little more than 10% in our turnover.”

(MOG)

“100% of our customers at this time are foreigners.”

(TOPDOX)

“Our product is mainly out there, 95% of the billing is abroad.”

(Widetail)

The companies must choose the countries to which they want to have business abroad, but it is essential to understand how they are going to make this. So, the fourth question was about the strategy that the companies take abroad. Ten of the seventeen

¹¹ This may contradict Loane and Bell (2006) in Chapter 2.4.1.

interviewees mentioned that they have one or more subsidiaries abroad¹² (2 of which have the headquarters in the USA and a subsidiary in Porto, although living/ working in Porto). The remaining 7 companies do not have a physical structure abroad, two of which stated that every work is done in Portugal, by a digital way. From the subsidiaries described in the interviews, it is possible to emphasize 10 countries where the companies have offices (see Table 3):

Table 3 – Number of subsidiaries of the interviewed companies by country¹³

COUNTRY	Nr OF SUBSIDIARIES	COMPANIES
USA	6	HypeLabs, Jscrambler, Mindera, MOG, Streambolico, Veniam
Brazil	2	Adclick, GEMA
United Kingdom	2	GEMA, Mindera
Angola	1	GEMA
Chile	1	Widetail
Germany	1	Mindera
India	1	Mindera
Mexico	1	GEMA
Poland	1	HypeLabs
Singapore	1	Veniam

Source: Own elaboration.

Despite some aspects (that can be different from company to company), as a commercial network (Adclick, MOG), local partners (AddVolt, GEMA, Infraspark, Jscrambler, MOG, Nonius, Streambolico, TOPDOX), sales process and support manager/ team (AddVolt, Infraspark, Veniam), some business development (Streambolico), these companies said that everything else is made in Porto, from operations, development, production or engineering; the selling process to Europe and the Rest of the World is also made through Porto. The following statement reinforces the aspects mentioned:

“There is a company that works from São Paulo (Brazil), and there are already about 30 persons there, so there is a dependency, even though they work in

¹² This may contradict Burgel and Murray (2000) in Chapter 2.4.3 and Johanson and Wiedersheim-Paul (1975) in Chapter 2.4.2.1.

¹³ Nonius does not specify in which countries has a subsidiary.

Brazil and we also work in Brazil from here, that is, the market is big, providing both functions. They work independently, they complement what we do.”

(Adclick)

There is not a regular strategy of business: some companies have offices abroad, and others do not, some have offices and partners abroad or offices and a commercial network (or the three together), or even just local partners and/or a commercial network, or none of these. The 2 companies that have the headquarters abroad (mentioned above) still have the production and all important operations in Portugal.

Some of the companies hire persons from the country where they locate an office, but have always one or more persons from the Portuguese office there. Some of the respondents also told that the CEO of the company or other nominee constantly travel to the countries for meetings or even to some commercial work. Analysing the fact that some companies have a subsidiary abroad and others do not have, it is possible to conclude that probably it has nothing to do with being a start-up or a scale-up. For example, HypeLabs was considered a start-up and have 2 subsidiaries abroad and B-Parts and OSTV, classified as scale-ups, do not have. Comparing this analysis with the previous, it is important to highlight some facts:

- There are no subsidiaries in geographically close countries, as Spain or France, two of the countries with more presence of the Portuguese companies;
- Although Africa was the region with less presence, there is a subsidiary there;
- The more required country (USA) is the country with more subsidiaries presented;
- About the Latin American countries, only Colombia does not have an office in there;
- United Kingdom, Germany and India, three of the most popular places, have subsidiaries, as expected.

The last question in this theme (internationalization process) was made to understand what were the main obstacles/ difficulties that the companies felt in the markets abroad, while internationalizing. The top five of the answers are listed in Table A3.11, in Appendix III. Cultural barriers are the biggest obstacle according to the interviewees, having the necessity to learn about the countries' culture (mentioned in

Chapter 2.4.1, McDougall and Oviatt, 1996), being Brazil, USA and India the most observed countries, as identified below:

- Brazil - difficult language codes:

“There is a very large cultural gap when we think that they are much more Latin than we are, and understanding their language codes was difficult.”

(GEMA)

- USA – lack of trust with foreigners (difficulty in selling if the seller is not American or if the selling is made from Europe):

“If it is not an American to sell to an American it becomes a bit more difficult, so everything else has to compensate (...) because we already have a handicap of not being American (...). And then the Americans are very used to doing local business.”

(Jscrambler)

“Selling in US from Europe is difficult, the ideal is to have a local sales team. Then, although the American market is much more homogeneous than the European because of the language, we find that selling in New York is not the same as selling in Texas or California. In this way it is necessary to perceive the local differences in order to approach the clients in the correct way.”

(TOPDOX)

- India - need of having accented good knowledge about the culture of India:

“The culture of India is very different, there is a shock, we have to read a lot about the culture of India (...) about what are the motivations of the Indian culture, how people work, what are the social hierarchies, what preferences do people have.”

(Mindera)

In a more general way, the lack of opening of the markets abroad leads to a greater difficulty in creating bonds with partners and customers to show the products:

“There are markets that, because of their culture, are not open to the outside as well as others, so the cultural issue and the way of creating ties with partners and clients is more difficult.”

(MOG)

On the second most given answer, credibility challenges (mentioned in Chapter 2.4.1, Sapienza *et al.*, 2006), some justifications were:

- Lack of physical presence in these markets: *“Sometimes not having a physical presence in the place becomes more complex, because we are somehow limited to the digital channel or the telephone and this, in some way for the clients in those geographies, can generate some distrust in investing in a supplier like us who is in Portugal.”* (Adclick);
- *“Difficulty in finding committed partners.”* (Infraspeak);
- *“Track record, history, (...) there must be automatic history and, if there is none, it is very difficult to gain credibility and confidence for the first test.”* (AddVolt).

Bureaucratic and legal issues, high investments in trips and stays (mentioned in Chapter 2.4.1, McDougall and Oviatt, 1996), and the different time zone from Portugal to other distant countries are other relevant complications. Other answers given about the greatest difficulties abroad were:

- *“Exchange rate fluctuations”* (Nonius);
- Find people with the desired skills: *“We have to find people who dominate the product (...) Culture must be mastered to do this work and we had some difficulty in finding people with this know-how.”* (7Graus);
- High human resources costs: *“Money to hire people, the costs are an absurd.”* (Streambolico);
- Restrictions on the entry of foreign capital: *“In South America there are still many restrictions on entering foreign companies.”* (Widetail).

5.4 Current company location

After understanding the success that the companies have abroad, the last question and theme was asked concerning the current companies' location. The more frequent answers to the question "What make you keep the company in Portugal (Porto)?", are described in Table A3.12, in Appendix III, with a top 10. The answer more times mentioned (7) was about the fact that the founders of the companies had born in Porto. Some of the answers systematized correspond to the SWOT analysis associated to the first question. Many of the answers were the same: good quality of life; access to qualified persons (second answer more times given); cheap work force; and low costs compared to US and European cities and Lisbon. Other answers also given in the first question that can be related to the top 10 of this question are: the better lifestyle compared to London or USA (e.g., Mindera) (in Porto there is quality of life, stability and security) and the difficulty in finding workers with this quality in other countries (e.g., GEMA) (in Porto there is high talent available).

Finally, to the question about if the company still produces in Portugal, if the core of the company remains in Porto, the answers were all given in the same sense: production and operations will always be in Porto, and this points to the fact that the development team is too important and cannot be moved to another country (mentioned in Chapter 2.4.3, Chetty and Campbell-Hunt, 2004). Some of the interviewees highlighted the fact that the sales process and sales support can be carried out abroad, with no need to move the company headquarters.

In conclusion, there were many different responses for the first part of the question ("What make you keep the company in Portugal (Porto)?") and a very large similarity in the second part, about the production remaining in Portugal. Nevertheless, it is possible to conclude that the major reasons explaining that the development of the products remains in Porto are two: (i) the founders of the company were born in Porto and (ii) there is really good talent in the city.

6. Conclusion

The main goal of this report was to study scale-up companies (or potential future scale-ups) and their evolution and internationalization, addressing the own start-ups and scale-ups of the city of Porto, already internationalized, and perceiving the dynamics around their growth and expansion in markets abroad. The research carried out allowed concluding that the scale-up subject is still scarcely explored and it is often linked to different scientific subjects. One goal is that Porto Digital also wins with this research, better understanding the start-up and scale-up companies and their needs, and working accordingly with this, also contributing to the improvement of the city of Porto in creating conditions for the establishment and success of national and international companies.

In the internship at Porto Digital, it was developed a research about the most entrepreneurial cities in the world, a study that can be used to turn Porto an even better city for start-up and scale-up companies and for innovative practices. The importance of incubators, highlighted in the activities of the internship (namely the interviews made) is in agreement with the statements of the companies (start-ups and scale-ups), where they spoke about the importance that incubators had in their growth and the fact that Porto is well served with these infrastructures. The support given in the activities, events and projects (national and international) of Porto Digital helped to better understand the dynamic involved in innovative ecosystems, namely in Porto, once, as Oksanen and Hautamäki (2014) stated, an innovative ecosystem has great universities, excellent talent, good establishments of R&D, institutions as incubators, and others, as were mentioned in the analysis as the biggest strengths of the city.

The strengths appointed by the interviewees were almost the same that were selected in the internship activity. It is possible to conclude that Porto can be a hub of scale-up attraction and their investment, through all the positive aspects mentioned in this report, proven with the fact that all the interviewed companies keep the production and development of their business in Porto. This can be related with the naturalness of the founders but also with the strengths of the city, especially because of the talent. However, other aspects less positive were mentioned – and it is important that the city

overcomes these obstructions – as the lack of visibility of the city, lack of spaces and the increase of renting prices.

About the scale-up concept, it was observed that there is not a strict designation of the companies into start-up and scale-up companies. Many of the analysed companies are on the threshold of both concepts, having the designation of potential future scale-ups, because they do not fit totally in the scale-up definitions and they are no longer start-up companies. Most of the interviewed companies produce products/ services that are more inherent to be scale, as appointed by Deloitte and THINK (2015), such as software, electronic, media, online services, and others. Some of the companies, although knowing the name “scale-up”, do not know exactly what it means or what are its features. With this report, it will be more clear to many companies what are the determinants and characteristics that companies of this type have, like the capacity and competences to manage a company, the knowledge and experience of the founders and the access to valuable networks in the origin country and outside. The most difficulties that these technological companies may face are related to financial capacities, the lack of an organizational structure, or even the difficulty in scale.

Moreover, with this research, it will be possible for entrepreneurs to understand some facts related to the internationalization process, based on the gathered testimonials, as the fact that although most of the companies initialize their internationalization instantly, some of them prefer to make this process by steps; the easiest countries to enter or in which more companies are (as USA); the obstacles that they may face (as cultural barriers and credibility challenges to new small companies with no historic). The small size of the Portuguese market was the reason more times mentioned to justify the expansion of the business abroad, along with the need to look for more clients. It was also registered that the countries culturally close to the Portuguese market were many times required. Countries geographically close to Portugal have some demand, although the reasons of this occurrence were others. Another perceived fact was about the lack of a regular strategy of internationalization, because there are companies with subsidiaries abroad (although some authors mentioned that it was not advisable) and others that do not choose this option, many of them with partners and networks abroad. It is impossible to highpoint a typical strategy for these companies.

In this study, some limitations conditioned the analysis, as

- the fact that the concept “scale-up” is new and with a scarce literature;
- the difficulty of finding companies that wanted to participate in the study (despite the attempts to contact them);
- the difficulty in separating the concepts “start-up” and “scale-up” and the fact that some companies do not fit in none of them;
- the lack of some data collected during the interviews, such as the countries in which some companies have presence; and
- the difficulty in defining an internationalization strategy for this type of companies.

It is not possible, due to the reduced size of the sample, to extrapolate to the universe the conclusions drawn from this research, even because it was carried out only to companies based in Porto. However, it is possible to say that in Portugal we have good examples of companies of this sort and that, especially in the city of Porto, the scale-up theme, as a name, is already known. This research is the beginning that, within a certain time, this concept could become a reality in our country.

The conclusions obtained lead to other complementary approaches that can be important to the evolution of this new concept. These approaches may be the study of the evolution of scale-ups to the next level and the analysis of the strategy that scale-up companies use abroad (in order to obtain a regular tactic). To future researches it is also important to deeply investigate the concept scale-up, harmonizing the theme, and extend the research to scale-ups from the rest of the country and from other countries, or even to international scale-ups located in Portugal.

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Appendices

Appendix I – A small bibliometric exercise on the term “scale-up”

A search in bibliometric databases for the keyword “scale-up” was made, on 4th of July:

- i. Database “Web of Science”: 20,963 documents; the main categories are “Engineering Chemical”, “Biotechnology applied microbiology”, “Chemistry multidisciplinary”, “Material science multidisciplinary” and “Energy fuels”;
- ii. The search is refined by selecting the category “Economics”: 63 documents;
- iii. Result analysis: the link “Web of Science Categories” shows the subjacent categories, represented in the following table:

Table A1.1 – Web of Science results to the Category “Economics”¹⁴

CATEGORIES	Nr OF ARTICLES	PERCENTAGE WITHIN “ECONOMICS”
Economics	63	100.000%
Health policy services	9	14.286 %
Health care sciences services	8	12.698 %
Planning development	8	12.698 %
Agricultural economics policy	6	9.524 %
Business	6	9.524 %
Management	5	7.937 %
Business finance	4	6.349 %
Pharmacology pharmacy	3	4.762 %
Social sciences mathematical methods	3	4.762 %
...

Source: Web of Science database.

- iv. With this refining, 16 documents are related to the categories “Business”, “Management” and “Planning Development”, of which 1 (published on January 2017) could fit the research.

¹⁴ The sum of the percentages of each category is not 100%, which happens because only the main categories (with more articles involved) are represented in the table. Notice that many articles also belong to diverse categories at the same time.

Even in the pure economic field, this term “scale-up” is used in other contexts, as scale of the production, public investments, sales, efficiency, behaviour, social companies and causes, and many other themes. For other key search combinations, the following results were gathered:

- “scale-up company”: 1 result about health;
- “scale-up firm”: no results;
- “scaleup”: 678 results but none within Economics;
- “scale-up” and “start-up”: 88 results but none within Economics;
- “scale-up” and “company”: 295 results but none within Economics;
- “scale-up” and “firm”: 80 results but none within Economics.

The same exercise was done in another database:

- i. Database “Scopus” (keyword: “scale-up”): 32,190 documents; the main categories are “Engineering”, “Chemical Engineering”, “Chemistry”, “Biochemistry, Genetics and Molecular Biology”, “Medicine” and “Material Science”;
- ii. The search is refined by selecting the categories “Business, Management and Accounting” and “Economics, Econometrics and Finance”: 460 documents;
- iii. Result analysis: the link “Scopus Subject Area” shows the subjacent categories, represented in the following table:

Table A1.2 – Scopus results to the Categories “Business, Management and Accounting” and “Economics, Econometrics and Finance”¹⁵

SUBJECT AREAS	Nr OF ARTICLES	PERCENTAGE
Business, Management and Accounting	364	79.1%
Economics, Econometrics and Finance	138	30 %
Engineering	130	28.3 %
Environmental Science	72	15.7 %
Social Sciences	64	13.9 %
Energy	59	12.8 %
Chemical Engineering	53	11.5 %
Computer Science	45	9.8 %
Decision Sciences	45	9.8 %
Agricultural and Biological Sciences	29	6.3 %

Source: Scopus database.

¹⁵ The sum of the percentages of each category exceeds the total of 100%. This happens because many articles are in diverse categories at the same time, being represented only the main categories in the table.

- iv. With this refining, 17 documents remain when a search for the word “start-up” is made within the 460 documents, of which half of them could be interesting for the report because some similarities to the general subject are found.

For other key search combinations, the following results were gathered:

- “scale-up company”: 1 result about health;
- “scale-up firm”: no results;
- “scaleup”: 846 results, 16 belonging to the area of “Business, Management and Accounting” although being related to Engineering and Biotechnology areas;
- “scale-up” and “start-up”: 108 results, 7 belonging to the areas of “Business, Management and Accounting” and “Economics, Econometrics and Finance”; 2 articles interesting to the research, although being the same founded in the first search;
- “scale-up” and “company”: 554 results, 47 belonging to the areas of “Business, Management and Accounting” and “Economics, Econometrics and Finance”; 2 articles interesting to the research;
- “scale-up” and “firm”: 127 results, 32 belonging to the areas of “Business, Management and Accounting” and “Economics, Econometrics and Finance”; 2 articles interesting to the research, although being the same founded in the first search.

Appendix II – Systematization of the literature review

Table A2.1 - Studies on start-up companies

Author (year)	Contribution
Acs <i>et al.</i> (2009)	Importance of the first years of life.
Audretsch <i>et al.</i> (2012)	Companies with new solutions and ideas represented in sectors with high level of technology. Relationship with the concept of knowledge-based economy.
Baptista <i>et al.</i> (2014)	Importance of entrepreneurial features when the company is not completely developed and is still organizing itself.
Bartelsman <i>et al.</i> (2005)	Importance of the first years of life because of the high probability to fail.
Brüderl and Preisendörfer (2000)	Reasons related to the fast growth of companies with innovative activities (small size and knowledge of the founders).
Cader and Leatherman (2011)	Relationship between firms' probability of failure and their area of activity and age. Reasons involved: industry characteristics, location, regional and national economic conditions and environmental factors.
Lautenschläger (2015)	Relationship between firms with a fast growth, technology based and with innovative activities, and the attraction of workers and the creation and growth of employment.
Luger and Koo (2005)	Concept regarding three characteristics: new, active and independent. Mention of the experience of the founder.
Schumpeter (1934) (<i>cfr.</i> Luger and Koo, 2005)	Positive relationship with the creation of employment, technological innovation and economic growth.

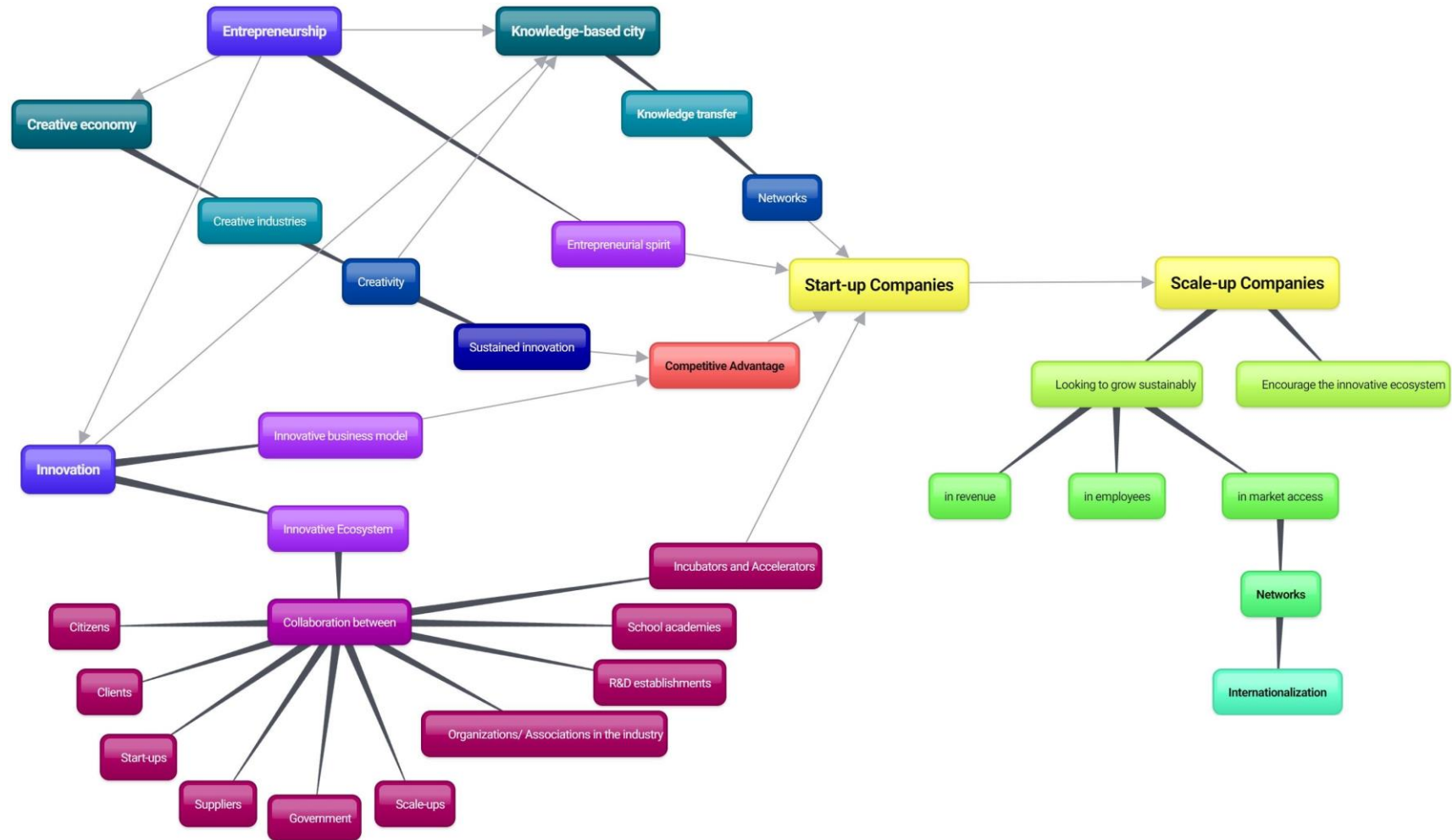
Source: Own elaboration.

Table A2.2 – Studies on scale-up companies

Author (year)	Definition	Characteristics
Coutu (2014)	Companies that can grow quickly in prolonged periods.	<ul style="list-style-type: none"> – Have a sustained average annual growth in workers or turnover in more than 20 per cent per year for three full years; – Have over 10 employed persons when the observation period starts; – Capacity to raise employment (highly skilled and quality) and attract skilled persons; – Ability to increase the capacity and efficiency of the production (and their market value); – Capacity to make networks with local companies and individuals; – Contributor to the rise of the national output.
Deloitte and THNK (2015)	Innovative new firms/ start-ups with a rapid growth in markets.	<ul style="list-style-type: none"> – Capacity to transform whole industries with new business models; – Capacity to face truly opponents; – Generators of employment.
Markides and Anderson (2006)		<ul style="list-style-type: none"> – Capability to stay away from possible competitive attacks from other firms, especially when the scale-up process is made quickly; – Rapid and sustainable growth. – Success in the market and generation of profits.
Onetti (2014)	A next stage of a start-up business that intends to enter in new markets, raise income and employees, and add value to the company.	Cooperation and link with other companies/ entities in external markets.
SEP Monitor (2015)	A more developed and established firm than a start-up.	Capability to raise employment and innovation in scale.
World Economic Forum (2014)	Expansion of a business regarding the access of markets, incomes, value that is added and number of workers.	Capability to identify and enjoy advantageous opportunities along with diverse players in the market.

Source: Own elaboration.

Figure 1 – Mind Map that contextualizes all concepts



Source: Own elaboration.

Table A2.3 – Studies about distances between markets

Author (year)	Concept	Explanation	Characteristics
Carlson (1975) (<i>cfr.</i> Johnsen and Johnsen, 1999)	Psychological Distance	A smaller psychological distance represents an internationalization to more close markets than the domestic one.	<ul style="list-style-type: none"> – Small firms – High technology firms
Johanson and Wiedersheim-Paul (1975)	Psychological Distance	Related with differences between nations, as: <ul style="list-style-type: none"> – Language spoken; – Culture; – Political systems; – Education; – Industrial development level. 	Can be irregular because of the improvement in communication techniques and in trade.
Johnsen and Johnsen (1999)	Psychological Distance		Companies are more likely to expand their business to countries with a culture similar to their home country.
Loane and Bell (2006)	Geographic and Psychological distances		Small entrepreneurial firms internationalize their business regardless some distances between their internal markets and the new ones.

Source: Own elaboration.

Table A2.4 – Studies about determinants and constraints of internationalization

Author (year)	Determinants	Constraints
Fletcher (2004)	<ul style="list-style-type: none"> – Intense rivalry in the domestic market; – Market saturation; – New opportunities in new markets (main reason for small firms): <ul style="list-style-type: none"> – spread of entrepreneurial abilities; – gathering new arrangements of products services and/or technologies; – use of network links. 	<ul style="list-style-type: none"> – Calculate the risks associated.
Johanson and Wiedersheim-Paul (1975)		<ul style="list-style-type: none"> – Lack of knowledge by the managers; – Lack of resources; – Risk of invest in different markets.
Knight and Cavusgil (1996) (<i>cfr.</i> Loane and Bell, 2006)	<ul style="list-style-type: none"> – The increase of trade liberalisation; – The evolution of economic integration; – The arising of ICT's and new processes; – The development of worldwide networks; – The internationalization of information and facilitating organizations. 	
Knight and Cavusgil (2004)	<ul style="list-style-type: none"> – The reduction of transaction costs between countries; – Markets globalization; – The homogenisation of consumer preferences in the world; – The advance of technologies in ICT's, production procedures, 	

	<p>and international transports and logistics in the world;</p> <ul style="list-style-type: none"> - The emergence of Internet and other correlated technologies. 	
McDougall and Oviatt (1996)		<ul style="list-style-type: none"> - Some costs associated, as logistical costs; - Need to learn about the country (laws, language, culture and competitors).
Oviatt and McDougall (1994)	<ul style="list-style-type: none"> - To increase the capital, production and sells. 	
Pinney (1970) (<i>cfr.</i> Johnsen and Johnsen, 1999)	<ul style="list-style-type: none"> - Knowledge of other languages besides the native one; - The experience acquired in other markets; - The early age of the manager. 	<ul style="list-style-type: none"> - Lack of competences; - Lack of resources.
Sapienza <i>et al.</i> (2006)	<ul style="list-style-type: none"> - Probability of growth; - More opportunities to grow and learn. 	<ul style="list-style-type: none"> - Change of the organizational structure; - Align resources with the pressure made by competitors, industry performance and consumer requests; - Lack of trust and reputation in those markets; - Huge investments.
Seringhaus (1993) (<i>cfr.</i> McDougall and Oviatt, 1996)	<ul style="list-style-type: none"> - National markets are not enough to overcome the expenditures of high tech companies. 	

Source: Own elaboration.

Table A2.5 – Studies about internationalization strategies of small firms

Author (year)	Strategy	Explanation	Characteristics
Chetty and Campbell-Hunt (2004)	Born Global Firms	Entry into several markets almost at the same time and in a fast way.	<ul style="list-style-type: none"> – Young age; – Small size; – Based on new technologies; – Only capable to be in niche/ emerging markets.
Fletcher (2004)	Born Global Firms	When a company starts its activity as an international company, soon after its creation.	<ul style="list-style-type: none"> – Develop entrepreneurship while internationalizing; – Inability to separate the activities from the international context and markets.
Knight and Cavusgil (2004)	Born Global Firms	Business organizations that from the beginning of its activity seek for better opportunities in other markets.	<ul style="list-style-type: none"> – Origin outside the domestic market, staying little time in this; – Characterized by innovation, knowledge and skills capable of being successful in external markets; – Organizational and strategic skills developed since the beginning for a global market focus.
Chetty and Wilson (2003)	International New Ventures	International focus since the first years of life.	
Oviatt and McDougall (1994)	International New Ventures	Type of start-ups that born almost internationally.	<ul style="list-style-type: none"> – Look for opportunities in several countries (use of the resources and sell the products); – More proactive than firms that pursue the gradual development; – Many times strategic alliances are the solution.
Fletcher (2004)	Late Starters	Small firms that tend to internationalize their business very fast, just one to three years after the creation of the firm.	<ul style="list-style-type: none"> – Entrepreneurial processes; – Development of themselves at regional/ national level for one year (or few more) in order to accumulate sufficient resources and competences; – A way to extend or modify ideas, visions and practices.
Chetty and Wilson (2003)	Uppsala Model	Stage model - a more slow and incremental strategy.	<ul style="list-style-type: none"> – Exploitation of internal market first;

			– Sell of products/ services abroad in more advanced stages.
Johanson and Vahlne (1977) (<i>cfr.</i> Chetty and Campbell-Hunt, 2004)	Uppsala Model	Firms only initialize their international experience when they have a solid base in domestic market.	Start with exportation mode: <ul style="list-style-type: none"> – 1st to countries where the psychological distance is lower to the home country; – Then, to more distant psychological countries.
Johanson and Vahlne (1977, 1990) (<i>cfr.</i> McDougall and Oviatt, 1996)	Uppsala Model	Incremental process that starts with a period of growth and maturation of the domestic market.	Gradual acquisition and growing commitment in external markets.
Johanson and Wiedersheim-Paul (1975)	Uppsala Model	Beginning of the internationalization process after the development in the domestic market.	<ul style="list-style-type: none"> – Gradual process by stages: <ul style="list-style-type: none"> 1st Exportation 2nd Internationalization via an agent 3rd Subsidiary for sells 4th Production abroad; – Export first to similar/ close countries to the home country; – More resources and knowledge acquired in each stage.

Source: Own elaboration.

Appendix III – Empirical analysis

Table A3.1 - Strengths and Weaknesses of the city of Porto according to Metropolitan Area of Porto

	Strengths	Weaknesses
Notoriety of the city of Porto		<ul style="list-style-type: none"> – Porto has little international visibility and notoriety, causing little capacity to attract investors.
Companies	<ul style="list-style-type: none"> – Presence of many infrastructures to support the allocation of companies, such as business parks, incubators, technological centres; – Increased cooperation and relationship between university and companies; – Existence of companies with a good position in markets abroad. 	<ul style="list-style-type: none"> – Weak relationship between universities and multinational companies; – Reduction in the number of start-ups created and the level of entrepreneurship; – Difficulties in incorporating chains of production of international companies in the city.
R&D institutes	<ul style="list-style-type: none"> – 75% of the research units were evaluated internationally with "very good" or excellent. 	<ul style="list-style-type: none"> – Few R&D institutions and companies present in international R&D networks.
Human Resources	<ul style="list-style-type: none"> – Filled with highly qualified human resources. 	<ul style="list-style-type: none"> – Poor qualification of the population in some industrial sectors, mainly in regions less centralized, representing an inferiority in the level of schooling when compared with Lisbon; – Growing emigration of young people seeking employment.
Mobility services	<p>Existence of good means of transport:</p> <ul style="list-style-type: none"> - main road network (external links); - surface metro network (with connections to major cities, airport and main railway stations); - intra-regional accessibility (road network and navigability of the Douro); - sea port (expansion of the cruise terminal at the Port of Leixões); - international airport (low-cost flights and airport expansion). 	<ul style="list-style-type: none"> – High rates of car use in the most cities of the Metropolitan Area of Porto; – Intra-county regions poorly served by public transport.
Tourism and Standard of Living	<ul style="list-style-type: none"> – Presentation of lower housing costs compared to the Metropolitan Area of Lisbon. 	<ul style="list-style-type: none"> – Considerable differences in the quality of life in the regions of Porto; – Low cultural participation of the population.
Cohesion and	<ul style="list-style-type: none"> – Reduction of the levels of aging, 	<ul style="list-style-type: none"> – High rate of unemployment,

Social Innovation	<p>when compared with other regions of the country;</p> <ul style="list-style-type: none"> – Existence of various programmes of social intervention and solidarity. 	<p>especially the long-term and for low-educated people;</p> <ul style="list-style-type: none"> – Increasing number of homeless people in areas with largest population; – Overcrowding in the largest urban centres.
Public spaces, Health and Wellness	<ul style="list-style-type: none"> – Existence of the Douro river, an important regularized water course; – An extensive coastline with quality beaches and fishing ports; – Presence of various natural resources that can provide an increased use of renewable energy, such as wind, wave, hydro, biogas and biomass. 	<ul style="list-style-type: none"> – Weak existence in urban centres of green spaces; – Increased coast erosion process; – Constraints to the contamination of soils and water resources; – Lower agricultural activity; – High concern about the availability of public water supply services, basic sanitation, wastewater treatment, and others.

Source: Adapted from Metropolitan Area of Porto, <http://portal.amp.pt/pt/3/amp20/>, accessed on 25.09.2016.

Table A3.2 - List of the interviewed companies and their typology

COMPANY	TYPE
Anje - Associação Nacional de Jovens Empresários	Incubator
CACE Cultural do Porto	Incubator
Cool.Office	Co-working space
CRU – Cowork	Co-working space
Facts Coworking	Co-working space
FoundersFounders	Co-working space
InvestPorto	Entity
Ninho de Empresas - Fundação da Juventude - StartUp Juventude	Incubator
OPO-LAB	Co-working space
Porto Design Factory	Entity
Porto i/o	Co-working space
Spin Logic Católica Porto	Incubator
Startup Pirates	Entity
Typographia Cowork	Co-working space
U. Porto Inovação	Entity
UPTEC	Incubator

Source: Own elaboration.

Table A3.3 - List of the main categories, themes and sub-themes of the Innovation Guide

Main categories	Themes	Sub-themes
Data and Infrastructure	Big data	Accountability
Environment and Mobility	Business intelligence	Application
Life in Community	Circular economy	Best practices
New forms of Economy	Co-creation and co-design	Bottom-up and Top-down
Smart City	Crowdsourcing	Business angel
To Rule	Digital economy	Carpooling
	e-governance	Cars haring
	Governance	Cloud computing
	Innovation ecosystems	Co-housing
	Internet of things	Co-working
	Living labs	Crowdfunding
	New economy	Data mining
	Open data	Ecosystem
	Public-private partnership	Energetic efficiency
	Smart economy	Environmentally friendly
	Smart growth	Gamification
	Smart living	Globalization
	Smart specialization	Green car
	Social innovation	Hackathon
	Sustainability	Human capital
		Incubator
		Innovation
		Integrated management centre
		Intermodality
		Interoperability
		Methodologies
		Nearly zero energy buildings
		Scale-up
		Sensors
		Social cohesion
		Start-up
		Unicorn

Source: Own elaboration.

Interviews Script



Interviews Script

These interviews, conducted with potential future scale-ups and established scale-ups (more developed and established companies than start-ups, characterized by a rapid growth in value added, number of employees, income and expansion in markets), have as main purpose to identify which are the critical factors of success and which are the main failures presented by the city of Porto, in what regards hosting this type of companies.

Through the testimony of some challenging and diversified international start-up and scale-up companies located in the city of Porto, it will be possible to better understand the determinants for a company to evolve into a scale-up and how can the city influence this process. Moreover, it will be possible to assess the advantages of being located in Porto, which are the difficulties in scaling and what are the motivations and obstacles to internationalization.

All the given answers will be used exclusively for academic purposes, being guaranteed the confidentiality.

Question 1 – Characterization of the city of Porto

1. In order to understand if the city of Porto has the capacity to become a booster for scale-up companies, how do you characterize the city of Porto, as a host city of start-ups and innovation? Answer to this question by identifying strengths and weaknesses (positive and negative points, or points to be improved) that can

influence the development of start-ups in the city, as well as the opportunities and threats that the city can take/ face.

Examples:

Strengths	Weaknesses	Opportunities	Threats
<ul style="list-style-type: none"> - <i>Collaboration between companies</i> - <i>Excellent or very good R&D facilities</i> - <i>Financial support</i> - <i>Good institutions of higher education</i> - <i>Institutions such as incubators or technological parks</i> - <i>Low costs</i> - <i>A receptive local market for innovative products</i> - <i>Skilled workers</i> - <i>Others</i> 	<ul style="list-style-type: none"> - <i>City with low international visibility</i> - <i>Difficulty in creating relationships at the international level</i> - <i>Lack of financial support/ incentives</i> - <i>Others</i> 	<ul style="list-style-type: none"> - <i>Global network</i> - <i>Increased vision linked to tourism</i> - <i>Support programmes in Europe, in particular under the Structural Funds</i> - <i>Others</i> 	<ul style="list-style-type: none"> - <i>Bureaucratic difficulties</i> - <i>Competition from more developed cities in the start-up environment, such as Amsterdam, Berlin or London</i> - <i>Competition of foreign investors for the start-ups located in Porto</i> - <i>Unfavourable macroeconomic environment</i> - <i>Others</i>

Question 2 – Characterization of the company and scaling-up process

1. According to the related literature, to be a scale-up, it is necessary to:
 - o have a sustained annual average growth of employees or turnover of more than 20% per year for three full years, or even,
 - o be in a phase after the start-up phase, where the company intends to enter in new markets, increase its revenue and number of employees and add

value to the own company through cooperation and connection with other companies/ entities in those markets.

Do you consider that your company fulfils both these requirements? If your company only fits in one definition, please indicate which one.

2. What are the characteristics of your company that you consider to have influenced/ retarded the scale-up process and subsequent internationalization? Why?

Examples:

Positives	Negatives
<ul style="list-style-type: none"> - Access to a vast network - Being at an incubator or an acceleration programme - Previous international experience - Product still non-existing in the market - Young age of the manager/ team - Others 	<ul style="list-style-type: none"> - Lack of a network - Lack of capacity of the company to manage a larger number of employees - Lack of financial capacity - Lack of management capacity - Lack of organizational structure (coordination and communication) - Problems of defining and implementing a general culture - Product not adapted to the market - Size of the company - Young age of the manager/ team - Others

Question 3 – Internationalization process

1. At what age did your company start the internationalization process?

2. What are the motivations related to the decision of internationalizing your company? What opportunities exist abroad that you can't find in Portugal?

Examples:

<i>Access to more customers in other markets</i>
<i>Better career opportunities</i>
<i>Better opportunities for innovation</i>
<i>Better working conditions/ incentives</i>
<i>Find professionals with the needed skills</i>
<i>Greater access to finance</i>
<i>Greater possibility of insertion in an important network</i>
<i>Higher financial returns</i>
<i>Less bureaucracy</i>
<i>Major scientific developments</i>
<i>More prestige</i>
<i>Other factors</i>

3. For which countries has your company internationalized? Why?

<i>Culturally close to Portugal</i>
<i>Geographically close to Portugal</i>
<i>Distant cultural and geographically, but where there is a niche of start-ups</i>
<i>Distant cultural and geographically, but where the managers had prior knowledge/ experience</i>
<i>Others</i>

4. What strategy did your company take abroad?

(For example: alliances, exports, agents)

5. What obstacles/ difficulties did you encounter in the markets during the internationalization process?

Question 4 – Current company location

1. What make you keep the company in Portugal (Porto)? Are you still producing in Portugal? Why?

Examples:

<i>Bureaucratic facilities</i>
<i>Government support</i>
<i>High talent available</i>
<i>Location of the productive system</i>
<i>Low costs</i>
<i>Loyalty to customers</i>
<i>Loyalty to the country</i>
<i>Quality R&D centres</i>
<i>Stability and safety</i>
<i>Others</i>

Thank you for your cooperation!

Table A3.4 - Information about the companies and the interviews

COMPANY	AREA(S) OF ACTIVITY	DESCRIPTION	WEBSITE	NAME OF THE INTERVIEWEE	JOB ROLE	OFFICE LOCATION	INTERVIEW DATE AND TIME	INTERVIEW FORM AND LOCAL
7GRAUS	Internet Media	Creation of quality content aimed at responding to the information and entertainment needs of Internet users.	https://www.7graus.com/	Rui Marques	CEO (co-founder)	Matosinhos	June 16 at 4 p.m.	Video call, Skype
ADCLICK, SA	Digital Performance Marketing	Generation of business corresponding to the needs of online demand and product/service offerings of our clients.	http://www.adclickint.com/	Nuno Lopes	Business Developer	Porto	May 31 at 11:30 a.m.	Presential, UPTEC
ADDVOLT	Automotive industry and energy management - hardware	Designs and develops electric controllers that intelligently and autonomously manage different sources of electrical energy - "cloud for energy" - providing transport companies in a more sustainable and ecological way.	http://www.addvolt.com/	Bruno Azevedo	CEO (co-founder)	Porto	June 8 at 6:30 p.m.	Presential, UPTEC
B-PARTS	Automotive and Internet	Online marketplace for automobile used parts that connects slaughter centres and auto shops. Web platform where it is possible to sell and distribute parts to car workshops.	https://www.b-parts.com/	Luis Vieira	Administrator (co-founder)	Porto	June 12 at 3 p.m.	Video call, Skype
GEMA - DIGITAL AND TECHNOLOGY AGENCY	Creative technology	Technological creativity to design, create and install solutions. Specialized in 3D and 4D Experiences, Holograms, Projections, Video Mapping, Virtual	http://gemadigital.com/	Mafalda Ricca	Sales and Marketing Manager	Porto	June 22 at 11 a.m.	Video call, Skype

		Reality, Augmented Reality, and others, combining these technologies to build solutions designed for brand activation, short term events and permanent installations.						
HELPPIER	Software	Online software service that allows customers to create aids and tutorials for websites or web applications.	http://www.help.pier.com/	Daniela Lopes	Marketing Manager	Porto	June 8 at 5 p.m.	Presential, UPTEC
HYPELABS	Networking	Software that enables communication between mobile devices even in situations where there is no connectivity to the internet or any other external network.	https://hypelabs.io/	Carlos Lei Santos	CEO (co-founder)	Porto	May 31 at 4:30 p.m.	Presential, UPTEC
INFRASPEAK	Maintenance Management Software	Through its web and mobile interfaces radically increases the control and productivity of its users, reducing bureaucracy, risks and costs.	http://home.infraspeak.com/	Felipe Ávila da Costa	Head of Customer Development (co-founder)	Porto	June 26 at 5 p.m.	E-mail
JSCRAMBLER	Web security	Development of innovative solutions for protection of Web applications, mobile applications and games.	https://jscrabble.com/	Pedro Fortuna	CTO (co-founder)	Porto	June 1 at 9 a.m.	Presential, UPTEC
MINDERA	Software	Building of high performance, resilient and scalable software systems (software engineering applications, including web and mobile) to enable businesses across locations.	http://www.mindera.com/	Sofia Reis	Ecosystems Explorer	Porto	June 8 at 10:30 a.m.	Presential, Mapfre Building
MOG	Broadcast media and Multimedia	Software and information technology solutions for televisions, production houses, broadcasters and technology providers.	http://www.mog-technologies.com/	Paulo Correia	Business Developer	Maia	June 8 at 2:30 p.m.	Presential, Tecmaia

NONIUS	Hospitality technology	Provider of technological solutions that allow hotel operators to offer digital services to their customers.	http://www.noniussoftware.com/pt-pt/	Marisa Pires	Marketing and Sales Assistant	Maia	July 5 at 6:30 p.m.	E-mail
OSTV	Broadcast media	Content creation media company designed for all platforms. Canal180 is an "Open Source" television channel dedicated to culture, arts and creativity.	http://www.ostv.pt	João Vasconcelos	Executive Director (founder)	Porto	June 26 at 5:30 p.m.	Video call, Skype
STREAMBOLICO	Software, data management, wireless communication	Software framework that delivers faster, more reliable and scalable wireless communication, without requiring any modifications to the networking infrastructure. Speed up downloads/ uploads on mobile devices.	http://streambolico.com/	Rui Costa	CEO (and co-founder)	Porto	June 20 at 5:30 p.m.	Video call, Skype
TOPDOX - MULTICLOUD APPS	Software	App for clouds and file servers, provides a mobile file access and sharing solution.	https://topdox.com/	Nelson Pereira	Co-founder	Porto	July 5 at 12:30 a.m.	E-mail
VENIAM, LDA	Wireless network	Commercialization of wireless network technologies for communication between vehicles, with a focus on smart mobility applications and connection to the Internet.	https://veniam.com	Alexandra Vieira	Community Manager	Porto	June 28 at 4 p.m.	Video call, Skype
WIDETAAIL	Software Development with open-source technology	Development of software for the web, especially e-commerce applications for small and medium size businesses. The key product is an e-commerce cloud solution that lets the client easily create an online shop.	http://widetail.com/	Filipe Gonçalves	Co-founder	Porto	June 29 at 11:30 a.m.	Video call, Skype

Source: based on the Website and LinkedIn of the interviewed companies.

Table A3.5 - Information about the year of foundation and the number of workers of the companies

COMPANIES	AREA(S) OF ACTIVITY	YEAR OF FOUNDATION	NUMBER OF WORKERS
7Graus	Internet media	2004	18
Adclick, SA	Digital Performance Marketing	2007	50 (150 in all group: Impacting Group)
AddVolt	Automotive industry and energy management	2014	8 (+ 3 in part-time)
B-Parts	Automotive and Internet	2013	10
GEMA - Digital and Technology Agency	Creative technology	2007	40
Helpier	Software	2015	8
HypeLabs	Networking	2015	9
Infraspeak	Maintenance Management Software	2015	9 (+ 2 in part-time)
Jscrambler	Web security	2007	22
Mindera	Software	2014	150
MOG	Broadcast media and Multimedia	2002	48
Nonius Hospitality Technology	Hospitality technology	2005	51
OSTV	Broadcast media	2010	12
Streambolico	Software, data management, wireless communication	2012	12
TOPDOX – MultiCloud Apps	Software	2014	4
Veniam, Lda	Wireless network	2012	65
Widetail	Software Development with open-source technology	2009	10 to 15

Source: Own elaboration.

Table A3.6 – Number of employees per company

EMPLOYEES	COMPANIES					
0 to 10	B-Parts	Helpier	HypeLabs	TOPDOX		
11 to 20	7Graus	AddVolt	Infraspeak	OSTV	Streambolico	Widetail
21 to 30	Jscrambler					
31 to 40	GEMA					
41 to 50	Adclick	MOG				
51 to 200	Mindera	Nonius	Veniam			

Source: Own elaboration.

Table A3.7 - SWOT analysis based on the interviews (absolute frequency of answers)

	SWOT	Nr	COMPANIES
STRENGTHS	Good institutions of higher education in Porto (such as the University of Porto, highlighting the Faculty of Engineering)	14	7Gaus, Adclick, AddVolt, B-Parts, GEMA, Helppier, HypeLabs, Infraspark, Mindera, Nonius, OSTV, Streambolico, TOPDOX, Veniam
	Access to qualified persons (mainly in the areas of engineering and IT)	13	7Gaus, AddVolt, B-Parts, GEMA, HypeLabs, Infraspark, Jscrambler, MOG, Nonius, OSTV, Streambolico, TOPDOX, Veniam
	Good quality of life	9	Adclick, B-Parts, Helppier, Infraspark, Jscrambler, Mindera, OSTV, Streambolico, Veniam
	Low costs compared to other US and European cities and Lisbon	9	7Gaus, Adclick, B-Parts, Infraspark, Mindera, Nonius, Streambolico, TOPDOX, Widetail
	Existence of institutions such as incubators or technology parks (space, networking, sharing of resources and knowledge)	6	Adclick, B-Parts, Infraspark, Nonius, TOPDOX, Widetail
	Very good quality and central airport (many direct and cheap flights to any point in Europe, United States or Asia)	4	AddVolt, Mindera, Streambolico, Veniam
	Cheap work force	3	AddVolt, HypeLabs, MOG
	Excellent or very good R&D facilities	3	Infraspark, Nonius, TOPDOX
	Good networking and access to global networks	3	B-Parts, Nonius, Widetail
	Good public transport operations and varied offer in the centre of the city	3	7Gaus, Adclick, Streambolico
	Relationship between universities and incubators (opportunities for internships for students, partnerships created at R&D level and talent acquisition)	3	Adclick, AddVolt, MOG
	Excellent companies created in Porto - technologically good	2	HypeLabs, Streambolico
WEAKNESSES	Reduced human resources for the existing demand	5	Jscrambler, MOG, Streambolico, TOPDOX, Veniam
	City with few international visibility	4	Infraspark, Jscrambler, Nonius, TOPDOX
	Lack of spaces for companies to set up their offices	4	7Gaus, GEMA, Jscrambler, Veniam
	Increase of the prices for offices and housing in the centre of the city	3	Adclick, HypeLabs, Widetail
	Inexistence of large events as happens in Lisbon or limited existence of entrepreneurship events, that can provide a greater exposure of the city's start-up community	2	Streambolico, Widetail
	Lack of financial support/ relevant incentives/ investors	2	B-Parts, Infraspark

OPPORTUNITIES	Increased visibility of the city because of the tourism and the awards received in this field	9	7Graus, Adclick, AddVolt, GEMA, Jscrambler, Nonius, OSTV, TOPDOX, Widetail
	Increase in the number of foreign companies that transfer their operations to Porto, increasing the employment	3	Adclick, Jscrambler, Widetail
	Advantage on Eastern European countries on good weather and proximity to the sea	2	AddVolt, HypeLabs
	Good industrial base in the North Region	2	AddVolt, OSTV
	Improvements in the economic performance and economic and fiscal stability, which allow a greater probability/ capacity to find activities that allow income	2	AddVolt, OSTV
	Increasing the visibility of the ecosystem	2	Infraspeak, Streambolico
	Visibility of the city that companies from Porto provide abroad	2	HypeLabs, Veniam
THREATS	Great competitiveness and visibility of the city of Lisbon	5	B-Parts, Helpier, HypeLabs, Jscrambler, Mindera
	Presence of decision centres and multinational/ large companies in Lisbon	5	AddVolt, Helpier, Mindera, MOG, Veniam
	Demanding fiscal and bureaucratic burdens	4	B-Parts, Infraspeak, MOG, Streambolico
	Existence of foreign companies that provide higher salaries than national companies, impairing smaller companies in the hiring of human resources	3	B-Parts, Jscrambler, Widetail
	Small size of the national market	3	Infraspeak, Mindera, MOG
	Unfavourable macroeconomic environment	3	Infraspeak, Nonius, TOPDOX
	Competition from more developed cities in this area, such as Berlin or London	2	Streambolico, TOPDOX

Source: Own elaboration.

Table A3.8 – Features that make possible the scale-up process (absolute frequency of answers)

ANSWERS	Nr	COMPANIES
Management skills/ competences - be reactive, flexible, available to reorganize, readapt, to change strategy, open and clear communication	6	7Graus, B-Parts, Mindera, MOG, Streambolico, Veniam
Previous international experience of the founders	5	Adclick, Mindera, Nonius, Veniam, Widetail
Existence of good entrepreneurial talents	4	7Graus, AddVolt, MOG, Streambolico
Opportunity to work with partners/ clients/ investors (national and/ or international)	4	AddVolt, Infraspark, OSTV, TOPDOX
Support from incubators and universities to develop the business idea - context of learning and sharing; infrastructures with good conditions	4	AddVolt, Helppier, Jscrambler, MOG
Very good and innovative technology / product	4	7Graus, MOG, OSTV, Veniam
Acceleration programmes	3	Helppier, HypeLabs, Infraspark
Access to a vast network	3	Infraspark, Mindera, Veniam
Differentiation of the product from the existent in the market	2	GEMA, Infraspark
Focus on international markets from the beginning	2	HypeLabs, MOG
People with various backgrounds and nationalities	2	Adclick, Widetail
Previous experience of the founders	2	Infraspark, Mindera
Product still non-existent in the market	2	Jscrambler, Nonius
Qualification of the founders	2	AddVolt, Infraspark

Source: Own elaboration.

Table A3.9 – Decision date for internationalization

COMPANIES	AGE
7Graus	Instantly
Adclick	Instantly
AddVolt	After 3 years
B-Parts	At the end of the first year
GEMA	After 5 years
Helppier	Instantly
HypeLabs	Instantly
Infraspark	During the first year (4 months)
Jscrambler	Instantly
Mindera	Instantly
MOG	Instantly
Nonius	After 2 years
OSTV	After some years
Streambolico	Instantly
TOPDOX	Instantly
Veniam	During the first year (4 months)
Widetail	Instantly

Source: Own elaboration.

Table A3.10 – Continents and countries where more companies have businesses (absolute frequency of answers)

CONTINENTS / REGIONS	Nr	COMPANIES	COUNTRIES	Nr	COMPANIES	MORE FREQUENT ENUMERATED REASONS
Africa	2	GEMA, Infraspak, Nonius	Angola	2	GEMA, Infraspak	- Culturally close (language: Portuguese): GEMA, Infraspak
Asia	5	HypeLabs, Mindera, MOG, Nonius, Streambolico, Veniam	India	3	HypeLabs, Mindera, Streambolico	- Markets with great potential: MOG, Veniam
			Japan	2	HypeLabs, MOG	
			Russia	1	HypeLabs	
			China	1	HypeLabs	
			Singapore	1	Veniam	
Europe	10	Adclick, AddVolt, B-Parts, GEMA, HypeLabs, Infraspak, Mindera, MOG, Nonius, OSTV, TOPDOX	Spain	6	Adclick, B-Parts, Infraspak, MOG, OSTV, TOPDOX	- Markets with large dimensions: B-Parts, MOG - Networks already established: MOG, OSTV
			Germany	5	AddVolt, B-Parts, Mindera, MOG, OSTV	
			France	4	Adclick, B-Parts, OSTV, TOPDOX	
			United Kingdom	3	GEMA, Infraspak, Mindera	
			Italy	2	TOPDOX, OSTV	
			Poland	2	HypeLabs, OSTV	
			Czech Republic	1	OSTV	
Latin America	5	7Graus, GEMA, Infraspak, Nonius, TOPDOX, Widetail	Brazil	4	7Graus, GEMA, Infraspak, Widetail	- Culturally close (language: Portuguese and Spanish): 7Graus, GEMA, Infraspak, Widetail
			Mexico	2	GEMA, Widetail	
			Chile	1	Widetail	
			Colombia	1	Widetail	
North America	10	Helpier, HypeLabs, Jscrambler, Mindera, MOG, Nonius, OSTV, Streambolico, TOPDOX, Veniam, Widetail	USA	10	Helpier, HypeLabs, Jscrambler, Mindera, MOG, OSTV, Streambolico, TOPDOX, Veniam, Widetail	- Market with great potential: Helpier, HypeLabs, MOG - Country receptive to new technologies, being easily adopted: Jscrambler, TOPDOX - Existence of good acceleration programmes: Helpier, HypeLabs - Location of many technological companies with greater economic power: Helpier, HypeLabs - Market with capital: HypeLabs, Veniam

Source: Own elaboration.

Table A3.11 – Main difficulties described by the interviewees when making business abroad (absolute frequency of answers)

ANSWERS	Nr	COMPANIES
Cultural barriers	7	GEMA, Jscrambler, Mindera, MOG, Nonius, TOPDOX, Veniam
Credibility challenges	4	Adclick, AddVolt, HypeLabs, Infraspak
Bureaucratic and legal issues (differences in country-to-country legislation)	3	AddVolt, MOG, Streambolico
High investments in trips and stays	3	Helpier, Mindera, OSTV
Time zone (especially the west coast of USA and India)	3	Helpier, Jscrambler, Mindera

Source: Own elaboration.

Table A3.12 – Reasons for having the core of the company located in Porto (absolute frequency of answers)

ANSWERS	Nr	COMPANIES
Naturalness of the founders being in Porto	7	7Graus, B-Parts, Mindera, MOG, Nonius, Veniam, Widetail
High talent available in the city	6	HypeLabs, Infraspak, Jscrambler, Nonius, TOPDOX, Veniam
Impossibility to move all the professionals to other country	4	7Graus, GEMA, MOG, Widetail
The desire of the founders to work in Porto	4	Adclick, Mindera, MOG, Veniam
Loyalty to the country	3	Adclick, B-Parts Nonius
Quality of life	3	HypeLabs, Infraspak, Jscrambler
Cheap work force	2	HypeLabs, Streambolico
Easier to hire qualified people in Portugal	2	Helpier, GEMA
Low costs	2	Infraspak, Nonius
Stability and security	2	Infraspak, Nonius

Source: Own elaboration.